Wastewater Collection System Rehabilitaion Program Final Report

CITY OF MERIDIAN

City of Meridian
Department of Public Works

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PIPELINE ANALYSIS, LLC

City of Meridian Department of Public Works

Wastewater Collection System Rehabilitation Program

WASTEWATER COLLECTION SYSTEM REHABILITATION PROGRAM
FINAL REPORT

TABLE OF CONTENTS

Page

CHAPTER 3 - SANITARY SEWER SYSTEM EVALUATION

CHAPTER 4 - HYDRAULIC EVALUATION OF COLLECTION SYSTEM

CHAPTER 5 - PUMP STATION EVALUATION

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ATTACHMENTS

ABBREVIATIONS

BWF — Base weather flow

CCTV — Cleaning and utilizing Closed-Circuit Television

CIPP — Cured in place pipe

d/D — Depth over diameter

DWF — Dry weather flow

EPA — Environmental Protection Agency

EX — Existing

FM — Flow meter

FOG — Fats, oils, and grease

fps — Feet per second

FUT — Future

GIS — Geographic Information System

GLUMRB — Great Lakes Upper Mississippi River Board

gpcd — Gallons per capita per day

gpd — Gallons per day

GPS — Global Positioning System

GWI — Groundwater Infiltration

HGL — Hydraulic grade line

HP — Horsepower

I/I — Inflow and infiltration

MDEQ — Mississippi Department of Environmental Quality

MSDS — Material Safety Data Sheet

PA — Pipeline Analysis, LLC

PACP — Pipeline Assessment Certification Program

PF — Peaking factor

Program — Wastewater Collection System Rehabilitation Program

PS — Pump Station

PVC — Polyvinyl Chloride

RDII — Rainfall Dependent Inflow and Infiltration

SDR — Standard Dimension Ratio

SSES — Sewer System Evaluation Survey

SSO — Sanitary Sewer Overflow

SUO — Sewer Use Ordinance

WEF — Water Environment Federation

WWF — Wet weather flow

WWTP — Wastewater Treatment Plant

Chapter 1

EXECUTIVE SUMMARY

The purpose of the Wastewater Collection System Rehabilitation Program (Program) is to provide the City of Meridian (City) with an evaluation of the existing wastewater collection system meter basins 5, 17, and 30 to identify improvement strategies for the wastewater collection system. This Program was developed by performing sanitary sewer evaluations on Basins 5, 17, and 30, temporary flow-monitoring, developing a City wide hydraulic model of the collection system, capacity assessment of the existing pump stations, and a collection system operational review.

1.1 PROJECT BACKGROUND

Meridian is located in the extreme east central portion of Mississippi. The City is approximately 46 square miles and has a population of approximately 38,314. The City's collection system consists of approximately 303 miles of gravity sewer system and conveys wastewater to two Treatment Plants, East Wastewater Treatment Plant and South Wastewater Treatment Plant. The City also maintains and operations sixty-one pump stations throughout the city to provide pressure where needed.

A previous report was prepared in January 2008 by Pipeline Analysis, LLC in conjunction with Carollo Engineers. This report was a detailed Sanitary Sewer System Evaluation of Basins 5, 17, and 30. This report is referenced in this document and was used in the development of the Program.

1.2 SEWER SYSTEM EVALUATION AND RENEWAL PROGRAM

To evaluate the flow hydraulics of the collection system, flow data from thirty temporary flow meters at key locations and flow data from the treatment plant were used. Infiltration/Inflow analysis was performed on the wastewater flow monitoring data provided rankings of the meter basins. Meter Basins 5, 17, and 30 were selected as high priority basins due to high Rainfall Dependent Inflow and Infiltration (RDII) rates.

The Meridian sanitary sewer system evaluation was performed to achieve following five major goals.

1. Infiltration/Inflow reduction
2. Collection system rehabilitation.
3. Regulatory compliance
4. Customer satisfaction
5. Cost Control

1.2.1 Manhole Inspections

Manhole inspections were performed on all accessible manholes within Meter Basins 5, 17, and 30 for a combined total of 643 inspected structures. The data collected during these inspections generated manhole rehabilitation recommendations. The recommendations are grouped into priority one or priority two categories based on the severity of the defect(s). The total estimated cost for manhole rehabilitation is $207,253.

1.2.2 Mainline Smoke Testing

Mainline smoke testing was performed in Meter basins 5, 17, and 30 on various sewer lines. Defects were placed into two categories based on their location on private property or within the municipal right of way. Detailed sketches and photographs were taken for each defect identified. The total estimated cost for private sector rehabilitation is $61,950.

1.2.3 Closed Circuit Television of Sewer Lines

To assess the condition of the sewer lines internal color television inspection was performed on 24,000 feet of gravity sewer in meter basins 5, 17, and 30. The gas company had previously performed 21,000 linear feet of inspection, which is incorporated on a limited basis. In addition, a study performed on several sewer lines in 1999 by Neel Shaffer and ADS was also incorporated on a limited basis. The estimated cost for the municipal mainline rehabilitation recommendations is $1,865,024.

1.2.4 Rehabilitation Findings

The rehabilitation plan includes several types of repair methods. The methods include, but are not limited to the following:

1. Cured in Place Liner, Pipe bursting, Open Cut Replacement.
2. Service line rehabilitation.
3. Point repair.
4. Manhole rehabilitation.
5. Point repair and CCTV inspection.

The total cost to repair defects located in Meter Basins 5, 17, and 30 and from the previous inspections is $2,134,227. The City should continue to inspect, test and repair located defects. This will extend the life of the collection system assets.

1.3 HYDRAULIC EVALUATION OF COLLECTION SYSTEM

A collection system model representing the City’s sewer system was used to assess the base wastewater and flow caused by RDII deficiencies.

1.3.1 Service Area

The City's sanitary sewer collection system conveys wastewater from customers within the boundaries of the City and residential areas adjacent to the City. The City's service area was divided into thirty sewer basins in order to perform comprehensive analysis of the collection system. Wastewater flows during storm events indicate that large volumes of RDII are entering the collection system. Rainfall averages for Meridian is approximately 57 inches per year.

1.3.2 Land Use

The type of land use in an area will affect the volume of the wastewater generated. The City provided information on existing and future land use within the service area. Existing land use classifications were based on information as defined in the City's Municipal Code.

1.3.2.1 Existing Land Use and Future Land Use

The City is composed primarily of single-family residential land use that average 2 to 4 dwelling units per acre. Single family residential accounts for approximately 30 percent (excluding right of way) of the developed land. High Density Residential units are typically located within the commercial districts and average 6 to 15 dwelling units per acre.

Future land use includes the projected expansion of the City through inclusion of several areas currently defined and the full build-out of those lands within the City. Therefore, the future land use represents the total build out of the service area and not a specific projection year. Most of the City is zoned for single family residential with pockets of high density residential areas located throughout the City.

1.3.3 Network Model Development

The collection system model includes the City's pipelines with a diameter of 10 inches or greater, all associated manholes, diversion structures, and two pump stations. GIS data provided by the City was entered into the hydraulic model, which included pipe length, diameter, invert elevations, and rim elevations. Some 8-inch diameter pipelines critical to the evaluation of certain collection system areas were added to the model as needed. The modeled system consists of approximately 65 miles of pipeline. To ensure the most accurate results possible the model was calibrated to both dry and wet weather flow events.

The City's sewer collection system was modeled to determine if the current collection system capacity is sufficient for existing conditions and future growth. Pipe segments whose calculated capacity is less than their predicted peak flow are identified in this report as "deficient" or "inadequate".

1.3.4 Capacity Analysis

The purpose of the capacity analysis was to identify areas in the collection system where flow restrictions occur or where pipe capacity is insufficient to pass peak wet weather flows. The

collection system was modeled and analyzed using the 5-year 24-hour design storm to determine the system capacity deficiencies. The capacity analysis was performed for the existing land use condition and the build-out scenario. Model results indicated that no SSOs occurred under the 5-year, 24-hour SCS Type II design storm conditions, however there were fourteen surcharged pipelines varying in size and location.

1.3.5 Existing System Recommendations

Recommendations are made for improvements to the existing system in order to eliminate problems identified. These recommendations include increase pumping capacity, increase conveyance capacity, and implementation of a sewer-flushing program.

1.3.5.1 Pumping Capacity

The model results and a separate pump station analysis shows the pump capacities of pump stations identified as LS-AN (Red Lobster) and LS-AT (65th Ave) should be increased to accommodate the existing design storm flows.

1.3.5.2 Conveyance Capacity

Based on simulation results, thirteen pipelines require improvements for existing conditions and one pipeline require improvements for future conditions during the 5-year, 24-hour design storm.

1.4 PUMP STATION EVALUATION

The City currently maintains and operates 61 sewer pump stations including three pump stations serving the Naval Air Station. Activities performed during the pump station evaluation include:

1. Development of a pump station asset database.
2. Updates to the City's GIS database including new force main locations, pump station locations, and pump station service areas.
3. Determination of pump station flow dependency.
4. Hydraulic modeling of flows to each pump station.
5. Assessment of pump station operational capacity.

1.4.1 Pump Station Asset Database

A pump station asset database was developed as part of the City's Wastewater Master Plan. The current pump station inventory includes information that was readily available from City records and information gathered from staff testimony.

1.4.2 GIS Database of Pump Station and Force Main Locations

Each pump station location was entered into the City's GIS database except for the three pump stations serving the Naval Air Station. Several force mains were also added to the GIS database

and some sewer mains re-routed according to City staff interviews. Estimates of base wastewater flow and Inflow and Infiltration (I/I) rates to each pump station were calculated.

1.4.3 Assessment of Pump Station Operational Capacity

Each pump station was evaluated according to its ability to handle the design flows of incoming wastewater. The analysis included the assessment of the largest pump at each station due to the limited availability of information. When design flows are compared with the rated capacity of the largest pump at each pump stations, fourteen pump stations are under capacity. Based on the results of the flow modeling, interviews with City staff, and future growth projections, four pump stations: 1) The Red Lobster Pump Station, 2) The 65th Ave. Pump Station, 3) The Hwy. 39 #1 Pump Station, and 4) The Newell Road #1 Pump Station deserved closer analysis.

1.4.4 Recommendations

The recommendations for pump station improvements are based on the limited information available for the pump stations. A more detailed investigation should be performed prior to implementation of the recommended improvements. Capacity improvements for the pump stations were divided into two categories based on the severity of the deficiency. Priority 1 pump station recommendations include improvements to the four critical pump stations, listed below:

1. Red Lobster
2. Newell Rd #1
3. Hwy 39 #1
4. 65th Ave

Priority 2 pump station recommendation included improvements to the ten under capacity stations, listed below:

1. Newell Rd #2
2. Newell Rd #3
3. Lower Bounds Rd
4. 61st Court
5. Days Inn
6. MCC
7. North Hills St.
8. North Wood East Apt.
9. Pancake Field
10. Village Fair Mall

The pump station asset database should be updated and completed. The current assessment was performed using the readily available information. Completion of the database would provide information necessary to perform a more detailed analysis. Missing data should be field acquired. This would provide the minimum information to perform a capacity analysis on the stations excluded from the analysis due to lack of information.

1.5 OPERATIONS REVIEW

The City of Meridian has undertaken a review and evaluation of the existing wastewater collection system operations in association with the Sewer System Evaluation Survey (SSES).

The utility has several existing support programs that will require little effort to integrate into the overall framework of the O&M program. The following existing programs/activities have been identified as needed on an on-going basis:

1. Geographic Information System (GIS).
2. The current work order system.
3. Hydraulic modeling.
4. Maintaining Record Drawings and Specifications.
5. Cleaning and utilizing Closed-Circuit Television (CCTV).
6. Budgeting and accounting for capital and O&M expenditures.
7. Sanitary Sewer Overflows (SSO's).

Overall, the City of Meridian has implemented many of the programs that are necessary to provide reliable service, sustained operation and maintenance of the wastewater collection system. The majority of the recommendations can be undertaken by city staff at minimal cost, however some will require going through the budgeting process. A list of recommendations is as follows:

1. Preventive maintenance cleaning.
2. Fill vacant employment positions.
3. Sewer Use Ordinance (SUO) update.
4. As-built record sewer construction drawings management.
5. GIS software utilization.
6. Hydraulic modeling of new pipes.
7. Annual safety drills.
8. Satellite City Agreements review.
9. Long-term funding for system rehabilitation.
10. Development of long-term Wastewater Collection System Program.

1.5.1 Collection System

An updated departmental organization chart will need to be developed to identify City staff responsible for implementing, managing and updating the SSO abatement programs. This includes the following staff member's titles:

1. Chief Administrative Officer and Director.
2. Operations Superintendent.
3. Field Supervisors.
4. Field Crew.

Reduction in sanitary sewer overflows is a priority for the City to maintain long-term compliance with the MDEQ and EPA. Due to the age of the existing infrastructure, soil conditions and rainfall potential; additional crews and equipment will be required to maintain the existing level of customer service and reliability. As a result, the cost of service can be expected to increase as existing sewers are rehabilitated and/or replaced and new sewers are added to the collections system. Increasing the funding for collections system repair and rehabilitation will be required in order to continue to provide reliable service. The Meridian system replacement value is $240 million with a design life of 100 years. This would equate to approximately $2.4 million per year to fully fund replacement of the system.

1.5.2 Maintenance

The City of Meridian has recently initiated a Sanitary Sewer Evaluation for the collection system. This evaluation will include developing a detailed plan to address SSO's and infiltration/inflow into the collection system. The following are the parameters used to evaluate the condition of the collection system:

1. Setting Priority Areas using flow data.
2. Manhole Inspections.
3. Smoke Testing.
4. CCTV.
5. Cleaning.
6. System Repairs.
7. Performance Tracking.

1.5.3 Engineering

Engineering provides support within the Public Works Department for streets, storm water, parks, etc. The support functions for the wastewater group include:

1. Maintaining standard design criteria and construction details for new installations of sewers, streets, drainage, and water distribution.

2. Review new construction with input from wastewater utilities staff.
3. Construction inspection.
4. Update collection system maps.
5. Maintain all assets in GIS system.

As-built plans are maintained by engineering and are used to validate the collection system maps and update the GIS. The sewer GIS should be completely updated using the 36” x 44” blue-line drawings.

Local consulting engineers use City standards and specifications for design of gravity sewer systems for new developments. The minimum gravity sewer size for new construction is 8-inch diameter PVC pipe rating SDR 26. A warrantee period of 1-year and review by line maintenance personnel is required as part of the design review process, but there is no written policy on warrantee review or approval.

Public works provides construction inspection services depending on the type of project. Construction warranties are generally required by contract although no written program has been developed to track the final warrantee inspection and final acceptance.

1.5.4 Technical Support Functions

The City utilizes a computerized work management system that tracks customer complaints, budgets, etc. This system requires additional labor efforts as compared to other more modern systems that the City should consider upgrading in the future.

The City has several media outlets to utilize to notify and/or inform the public as part of their contingency planning. The Line Maintenance Superintendent is responsible for regulatory notification issues associated with the collection system. Only 16 of the 55 pump stations are equipped with telephone telemetry to notify staff of any operational issues. Replacement components for the pumps and spare pumps controls are kept as part of the maintenance inventory. The purchasing department maintains an inventory of supplies for pipe, fittings, valves, etc. for the collection system.

The existing SUO for the City prohibits discharges of storm water, grease, fats, etc. into the collection system. The SUO should be updated to address the issues of extraneous infiltration/inflow and fat, oils and grease (FOG). Sewer blockages as a result of FOG are the primary cause for sanitary sewer overflows.

1.5.5 Administrative Support

The City of Meridian maintains written job descriptions for all positions within the Public Works Department. The Civil Service Selection System is used to fill vacant positions. Employees are held personally responsible for their actions and safe conditions in their work areas. A priority for the safety committee would be to review and update safety programs.

The City of Meridian staff prepares and tracks the budgets. The budgets do not appear to have sufficient funding for system rehabilitation, Program projects, and emergency repairs. The City Council reviews and adjusts the user rates as necessary. Increased funding is required in order to provide the Public Works Department with the resources needed to maintain and expand the infrastructure.

1.6 WASTEWATER COLLECTION SYSTEM REHABILITATION PROGRAM

The end result of this study is a Program that itemizes suggested improvements by basin for existing and future conditions. Although the plan set forth in this section covers existing and future conditions, the Program should be reviewed and updated annually as part of the City's continuous endeavor to maintain an adequate sewage collection and treatment system. Proactive planning up front will enable the City to serve its current population and anticipated service area growth satisfactorily.

The Program summarizes rehabilitation and replacement of failing infrastructure identified during the field inspections, and capacity deficiencies in the collection system during the hydraulic modeling, and pump station deficiencies identified through the analysis of existing pump stations. When fully implemented, the Program will allow the conveyance of peak wet weather flows to the wastewater treatment plant (WWTP) during both existing and future conditions.

1.6.1 Program Development

The Program recommendations are divided into two categories based on the type and severity of the deficiency. Category 1 Program recommendations include Priority 1 defects identified during the field inspection, existing capacity improvements identified during the hydraulic modeling and Priority 1 pump station deficiencies. Priority 1 deficiencies are defined as failures of pipes or manholes, hydraulically deficient pipes for current flow conditions, and pump stations at high risk for capacity failure.

Category 1 recommendations are summarized in Table 1.1, Table 1.2, and Table 1.3.

Table 1.1 Category 1 Summary for Priority 1 Rehabilitation Wastewater Collection System Rehabilitation Program City of Meridian, MS

Type	Occurrences
Manhole Rehabilitation	117
Private Sector Rehabilitation	69
Public Sector Rehabilitation	39
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	21
Mainline Rehabilitation	28

Table 1.2 Category 1 Summary for Hydraulic Model Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Problem ID	Basin	Manhole		General Location	Diameter (in		Length
		Upstream	Downstream		Existing	Proposed	(ft)
EX-17-1	17	G27-179	G27-177	Along 34th Ave. between 12th St. and 11th St.	12	18	345.9
EX-10-1	10	E28-009	LS-AT	About 1,500 ft east of MS Hwy 19 and N. HILL St.	16	21	3119.0
EX-8-1	8	F25-036	F25-030	About 600 ft north of I29 and 49th St., between 5	24	30	1431.4
EX-10-2	10	F30-175	F30-158	East of Oak Dr. between Bounds Rd. and Spruce St.	10	18	1199.8
EX-10-3	10	F31-070	F30-185	300 ft east of Bounds Rd. and 62nd Ave. 17th St. a	10	18	999.6
EX-18-1	20	G29-032	G28-053	Along 33rd Ave., between 17th St. and 21st St.	10	18	1430.5
EX-12-1	12	G25-017	G25-015	East of 49th St., between 1st St. and Front Rd.	18	24	1164.5
EX-1-1	1	G25-043	G25-029	North of I20 between 49th Ave. and 31st Ave.	24	30	1005.6
EX-17-2	17	G26-268	G25-078	Along 36th Ave., between 2nd St. and Interchange	27	36	593.5
EX-27-1	27	I28-069	I27-080	North of 8th Ave., between B St. and US Hwy 45	15	24	2390.1
EX-13-1	13	G28-152	G26-128	Along 45th Ave., between 14th St. and 5th St.	24	36	3556.4
EX-17-3	17	G27-183	G27-163	Along 34th St. between 12th St. and 10th St.	12	21	1004.1
EX-15-1	15	G32-078	G31-131	Along 34th Ave., 35th Ave. and 36th Ave.	10	18	2927.1

Table 1.3 Priority 1 Lift Station Recommendations Wastewater Collection System Rehabilitation Program City of Meridian, MS			
Pump Station	**Existing Pump Capacity (gpm)**	**Total Cumulative Incoming Flows to Pump Station (gpm)**	**Design Flow with estimated 20% Growth (gpm)**
Red Lobster	1,000	1,277	1,500
Newell Rd #1	275	775	900
Hwy 39 #1	275	688	800
65th Ave.	1,200	1,979	2,400

Category 2 Program recommendations included Priority 2 defects identified during the field inspection, future capacity improvements identified during the hydraulic modeling and Priority 2 pump station deficiencies. Priority 2 deficiencies are defined as defects in pipes or manholes, hydraulically deficient pipes for future flow conditions, pump stations that are at risk for future capacity failure. Category 2 recommendations are summarized in Tables 1.4, Table 1.5, and Table 1.6.

Table 1.4 Category 2 Summary for Priority 2 Rehabilitation Wastewater Collection System Rehabilitation Program City of Meridian, MS	
Type	**Occurrences**
Manhole Rehabilitation Priority 2	349
Private Sector Rehabilitation Priority 2	113
Public Sector Rehabilitation Priority 2	105
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report) Priority 2	124
Mainline Rehabilitation Priority 2	12

Table 1.5 Category 2 Summary for Hydraulic Model Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Problem ID	Basin	Manhole		General Location	Diameter (in		Length (ft)
		Upstream	Downstream		Existing	Proposed	
FUT-5-1	5	J33-004	J31-050	Between N. Hills St. and Old US Hwy 45	10	18	5027.0

Table 1.6 Priority 2 Lift Station Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station	Existing Pump Capacity (gpm)	Total Cumulative Incoming Flows to Pump Station (gpm)	Design Flow with estimated 20% Growth (gpm)
Newell Rd #2	250	458	500
Newell Rd #3	100	392	500
Lower Bounds Rd	150	154	200
61st Court	75	89	100
Days Inn	150	152	200
MCC	100	203	200
North Hills St.	45	117	100
North Wood East Apt.	150	371	400
Pancake Field	100	108	100
Village Fair Mall	100	148	200

PROJECT BACKGROUND

Meridian is located in the extreme east central portion of Mississippi. The City is approximately 46 square miles and has a population of approximately 38,314. The Water and Sewer Department serves approximately 14,200 customers, the Naval Air Station, and also collects wastewater from the city of Marion. The collection system consists of approximately 325 miles of gravity sewer and 61 pump stations.

2.1 PRIMARY PROJECT TASKS

The goal of this project is the development of a Collection System Rehabilitation Program that identifies long-term improvement strategies for the wastewater collection system. Four major tasks were performed to complete this goal. They are:

1. Sanitary Sewer System Evaluation of a selected portion of the collection system.
2. Development of a City Wide Hydraulic Model of the Collection System.
3. Capacity Assessment of the Existing Lift Stations.
4. Collection System Operational Review.

These tasks are described in more detail in the following sections of this report.

2.2 ADDITIONAL PROJECT TASKS

Temporary flow-monitoring program was performed in addition to the above four tasks. This flow data was used to perform an Inflow and Infiltration analysis. The results from this analysis were used to select the portion of the collection that would be included in Sanitary Sewer System Evaluation. The flow data was also utilized during the hydraulic modeling.

The City GIS was updated prior to the development of the hydraulic model. Existing pipe diameter, lengths and inverts were entered into the GIS database. A Citywide sewer atlas was prepared using the updated GIS.

Chapter 3

SANITARY SEWER SYSTEM EVALUATION

3.1 INTRODUCTION

To evaluate the flow hydraulics of the collection system flow data from thirty temporary flow meters at key locations and flow data from the treatment plant were used. Rainfall totals at ten locations were used to evaluate the Rainfall Dependent Inflow and Infiltration characteristics of the flow meter basins. Infiltration/Inflow analysis performed on the wastewater flow monitoring data provided rankings of the meter basins. Meter Basins 5, 17, and 30 were selected as high priority basins due to high RDII rates. A pervious study was performed in 1999 over multiple basins; these results are included in this analysis. The ranking of the all of the Basins is included in Attachment A1.

3.2 SEWER SYSTEM EVALUATION AND RENEWAL PROGRAM

The Meridian sanitary sewer system evaluation for Meter Basins 5, 17, and 30 was performed to achieve following five major goals.

1. Infiltration/Inflow reduction.
2. Collection system rehabilitation.
3. Regulatory compliance.
4. Customer satisfaction.
5. Cost Control.

Collection system renewal is a continual process of including identifying defects, prioritizing them, and fixing them. A typical goal is to inspect the system on a ten-year cycle or 10% of the system per year. Applying this procedure to Meriden would require inspecting 172,000 linear feet annually.

American Society of Civil Engineers performed an EPA sponsored study that collected data on wastewater collection systems nationwide. This provided collection system managers the ability to compare their reinvestment in to the collection system. Application of this benchmark to Meridian is shown below.

1. Meridian should reinvest 3 million a year in the collection system.
2. Removing the need to replace newer PVC pipe would reduce the reinvestment to 2.4 million.
3. The City would need to invest $428,000 per year for system maintenance.
4. The EPA study recommends a minimum cleaning program of 20% per year.

Several tools can be used to locate structural and Inflow/Infiltration defects of a sanitary sewer system. These include flow metering, manhole/pipe inspection smoke testing, and CCTV (closed circuit television) inspection.

Collection system rehabilitation methods are used to extend the life of the existing assets. Manhole rehabilitation methods include lining, sealing, installing watertight ring and covers, rising buried manholes, replacing vented covers, etc. Mainline sewer rehabilitation include cured-in-place (CIPP), slip lining and upsizing or pipe replacement by pipe bursting. These methods include trenchless technologies, which limits the impact to the customers.

3.2.1 Manhole Inspections

Manhole inspections were performed on all accessible manholes within Meter Basins 5, 17, and 30 for a combined total of 643 inspected structures. The manhole inspection included the following observations:

1. Casting/cone condition.
2. Manhole wall condition.
3. Manhole bench flow conditions.
4. Influent and effluent pipes.
5. Silt deposition.

Manhole rehabilitation recommendations were generated using the data collected during the physical inspections. The recommendations are grouped into three priority categories based on the severity of the defect(s) located. They are:

1. Priority 1 defects are severe and require immediate attention due to failure or imminent failure.
2. Priority 2 defects require repair when funding is available.
3. Priority 3 defects are minor and do not require repair.

Estimated costs for each repair were determined. The total estimated cost for priority 1 and 2 manhole repairs is $207,253. Table 3.1 summarizes the manhole rehabilitation recommendations.

Table 3.1 Manhole Rehabilitation Summary Wastewater Collection System Rehabilitation Program City of Meridian, MS	
Type of Rehabilitation	**Occurrences**
Replace Manhole Ring and Cover	46
Realign and Seal Manhole Ring and Cover	108
Raise Manhole or Mainline Cleanout to Grade	49
Structurally Repair Chimney/Cone and Coat	32
Clean Manhole, Repair as Needed and Coat	43 (333 VF)
Reconstruct Manhole Bench and Invert	15
Install Inflow Protector Insert for Manhole, T-cone stopper for cleanout	121
Stop I/I Clean, Repair Pipe Seal and/or Seam and Coat Area	52
Priority 1 Total Cost	$41, 193
Priority 2 Total Cost	$166,061
Total Manhole Rehabilitation Cost	$207,253

3.2.2 Mainline Smoke Testing

Mainline smoke testing was performed in meter basins 5, 17, and 30. Smoke testing is accomplished by pressurizing non-toxic smoke into the sewer pipe and defects are identified in the public sewer line or private lateral when smoke escapes through the defects. Once located the defects are placed into two categories based on the position of the defect. These categories are private property and municipal right of way. Detailed sketches and photographs were taken for each defect identified. The total estimated cost for private sector cost is $61,950. Table 3.2 summarizes the private sector rehabilitation recommendations.

Table 3.2 Private Sector Rehabilitation Summary Wastewater Collection System Rehabilitation Program City of Meridian, MS	
Type of Rehabilitation	**Occurrences**
Disconnect Abandoned Service Line	56
Disconnect Roof Drain	1
Install Clean Out	2
Notify Resident of Faulty Plumbing	10
Point Repair	64
Replace Missing Cleanout Cap	26
Repair Broken Cleanout	23
Priority 1 Total Cost	$26,100
Priority 2 Total Cost	$35,850
Total Manhole Rehabilitation Cost	$61,950

3.2.3 Closed Circuit Television of Sewer Lines

Internal color television inspection was performed on 24,000 feet of gravity sewer in meter basins 5, 17, and 30 to assess the pipe condition, as shown in Table 3.3. A study performed in 1999 by Neel Shaffer and ADS was incorporated as shown in Table 3.4. Appropriate caution should be taken when implementing the recommendations obtained from the Neel-Shaffer and ADS based recommendation due to the age of the data. In addition to the above inspections, the gas company had previously performed 21,000 linear feet of inspection in various basins, as indicated in Table 3.5. Municipal mainline rehabilitation recommendations were generated using the information with an estimated total cost of $1,865,024. Table 3.3, Table 3.4, and Table 3.5 summarize the estimated mainline rehabilitation costs for the various inspections.

Table 3.3 Public Mainline Rehabilitation Summary Wastewater Collection System Rehabilitation Program City of Meridian, MS	
Type	**Occurrences**
Cured in Place Pipe	69 (18,5508 LF)
Dye Flood/CCTV	2 (672 LF)
Plug Overflow Pipe at Manhole G26-041	1
Point Repair	34
Point Repair/ CCTV	1 (300 LF)
Plug Overflow Line at Manhole	1
Repair Broken Cleanout	2
Replace Section of Mainline	1
Replace 6 inch Line Segment	5 (1,308 LF)
Public Mainline Rehabilitation Priority 1 Cost	$60,866
Public Mainline Rehabilitation Priority 2 Cost	$1,386,273
Public Mainline Rehabilitation Total Cost	$1,447,139

Table 3.4 Neel Shaffer/ADS Rehabilitation Summary Wastewater Collection System Rehabilitation Program City of Meridian, MS	
Type	**Occurrences**
Disconnect Abandoned Service Line	21
Smoke Test to Confirm Segment for Dye Flood and CCTV	42
Point Repair	61
Repair Service Cleanout	21
Repair Mainline Cleanout	1
Public Mainline Rehabilitation Priority 1 Cost	$9,450
Public Mainline Rehabilitation Priority 2 Cost	$43,450
Public Mainline Rehabilitation Total Cost	$52,900

Table 3.5 Public Mainline Rehabilitation Summary (From Gas Company Videos) Wastewater Collection System Rehabilitation Program City of Meridian, MS	
Type	**Occurrences**
Cured in Place Pipe	12 (4,011 LF)
Point Repair	28
Remove Roots	4
Public Mainline Rehabilitation Priority 1 Cost	$69,741
Public Mainline Rehabilitation Priority 2 Cost	$295,244
Public Mainline Rehabilitation Total Cost	$364,985

The rehabilitation plan includes several types of repair methods. The methods include, but are not limited to the following:

1. Cured in Place Liner, Pipe bursting, Open Cut Replacement.
2. Service line rehabilitation.
3. Point repair.
4. Manhole rehabilitation.
5. Point repair and CCTV inspection.

The total cost to repair defects located in Meter Basins 5, 17, and 30 identified during this evaluation is $2,134,227. The City should continue to inspect, test and repair located defects. This will extend the life of the collection system assets. The recommended order for testing should follow the rankings of the meter basins.

HYDRAULIC EVALUATION OF COLLECTION SYSTEM

The City sewer system has evolved over the years during its increasing development due to the quality of life, recreational access, and educational and medical services. To handle the elevated flows the aging sewer system is in need of selective replacement and rehabilitation.

The purpose of the model is to evaluate the capacity of the existing collection system during peak wet weather flows and to develop improvement recommendations that will provide the City with a reliable and economic wastewater collection system for the future.

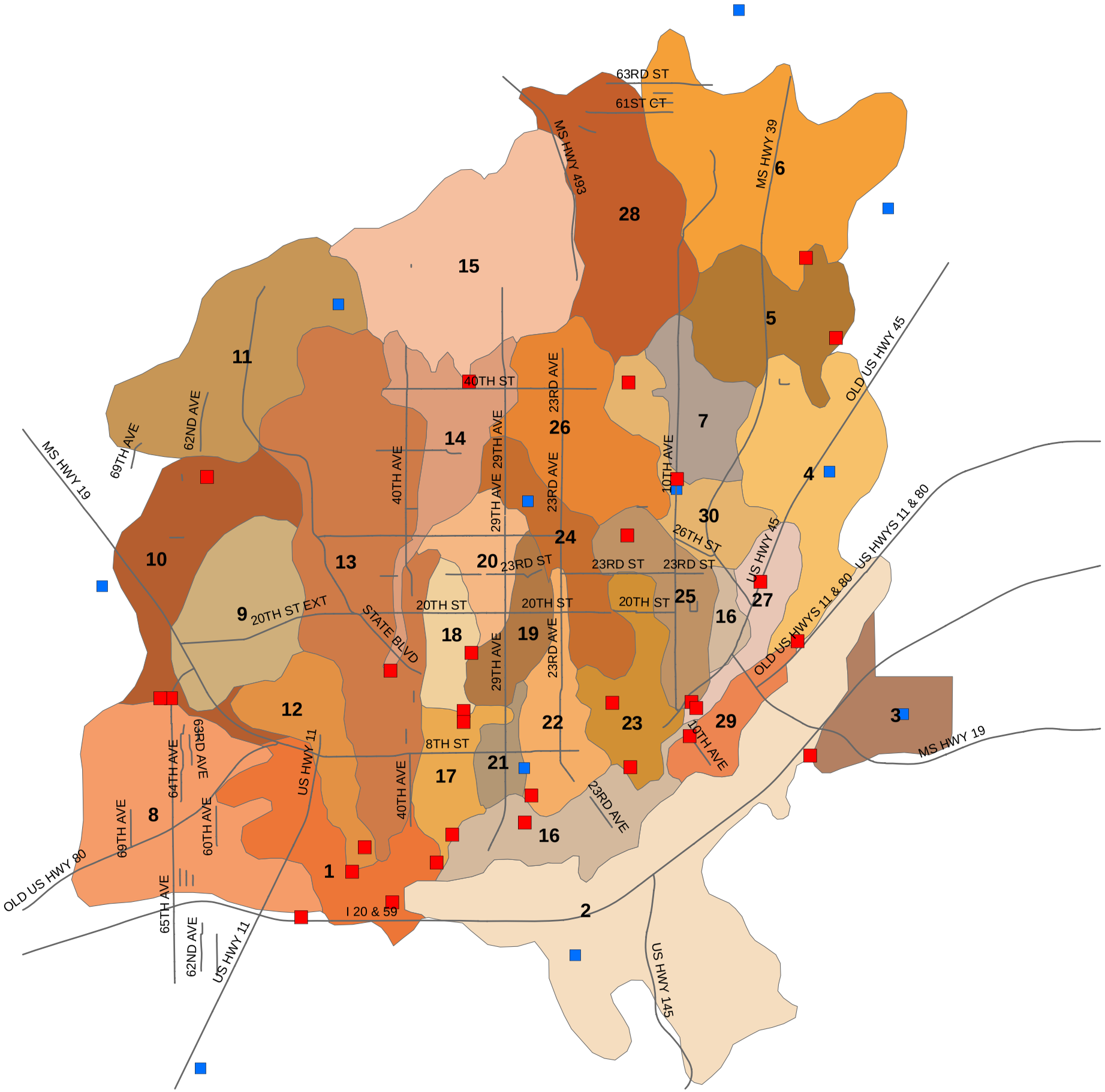
This Chapter describes the City's service area and the physical factors that influence sanitary sewer flows and defines the information and assumptions used to develop the City's collection system hydraulic model. These factors include general background information, flow monitoring activities, hydraulic model development, and pipe capacity analysis.

4.1 SERVICE AREA

The City's sanitary sewer collection system conveys wastewater from customers within the boundaries of the City and residential areas adjacent to the City to the wastewater treatment plant. The wastewater treatment plant accepts sanitary flows from about 303 miles of gravity sewers.

In order to perform comprehensive analysis of the collection system, the service area was divided into thirty sewer basins as shown in Figure 4.1.

The sewer system in the service area is aging and in need of selective rehabilitation and replacement to handle the elevated flows from the inflow and infiltration. Wastewater flows during storm events indicate that large volumes of RDII are entering the collection system. These increased flows limit the amount of additional flow that can enter the system and result in a system operating at its peak capacity. Rainfall averages 57 inches per year.



Legend

- Flow Monitors
- Rain Guages
- Streets
- Meter Basins

N

0 4,000 Feet

City of Meridian, MS
Wastewater Master Plan

Figure 4.1

STUDY AREA

4.1.1 Land Use

Land use information is an integral component in estimating the amount of wastewater generated within any City. The type of land use in an area will affect the volume of the wastewater generated. Adequately estimating the generation of wastewater from various land use types is important in sizing and evaluating collection system facilities.

The City provided information on existing and future land use within the service area. Existing land use classifications were based on information as defined in the City's Municipal Code. Both the existing and future land use data were provided to Carollo in GIS format. Descriptions of the various land use types are presented in the following sections.

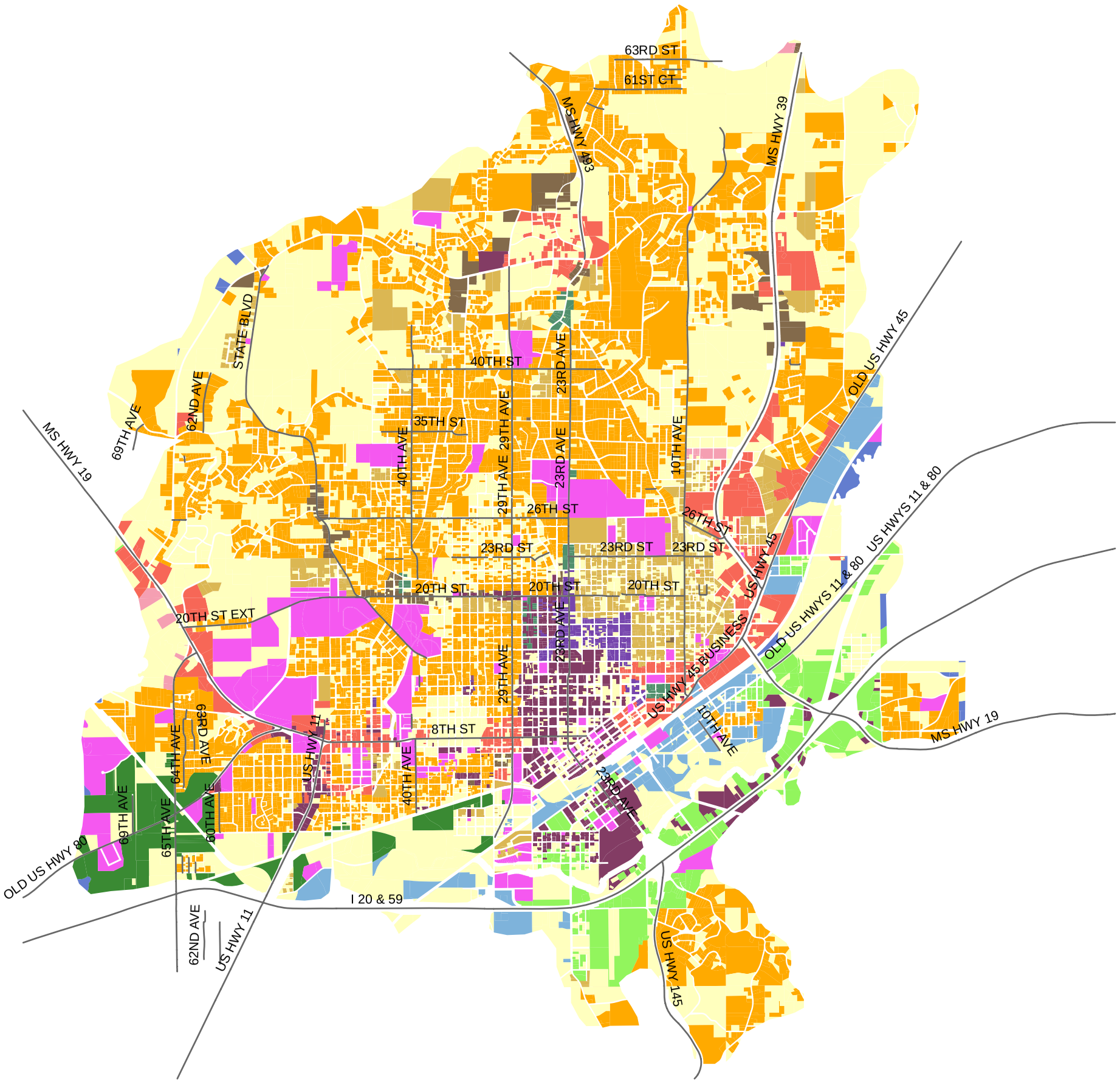
4.1.1.1 Existing Land Use

Figure 4.2 presents the existing land use classifications within the service area. The distribution of existing land use within the service area in terms of acreage and percentage is presented in Table 4.1. Results from the table show that the City is composed primarily of single family residential land use that average 2 to 4 dwelling units per acre. Single family residential accounts for approximately 30 percent (excluding right of way) of the developed land. High Density Residential units are typically located within the commercial districts and average 6 to 15 dwelling units per acre.

4.1.1.2 Future Land Use

Future land use includes the projected expansion of the City through inclusion of several areas currently defined and the full build-out of those lands within the City. Therefore the future land use represents the total build out of the service area and not a specific projection year. The number of developed acres for each land use type is presented below for current and future planning scenarios.

Figure 4.3 illustrate the locations of the various land use classifications used in the model for the future scenario. Table 4.1 show the areas associated with the future land use scenarios. Most of the City is zoned for single family residential with pockets of high density residential areas located throughout the City.



Legend

- Agricultural
- Central Business
- General Business
- Heavy Industrial
- High Density Residential
- Light Industrial
- Medium Density Residential
- Neighborhood Business
- Professional Business
- Public Use
- Regional Business
- Residential-Business
- Single Family Residential
- Vacant

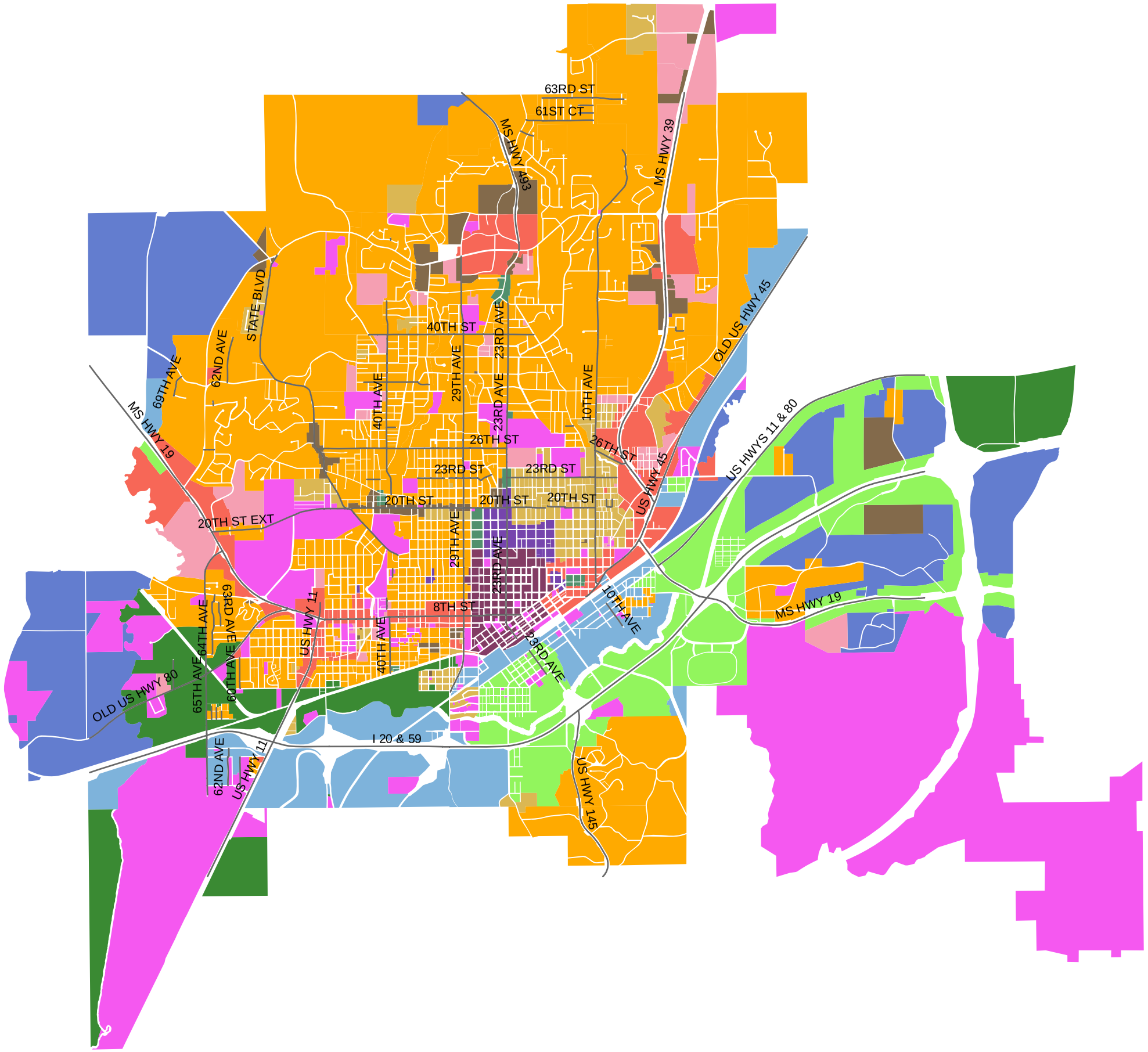
N

0 4,000 Feet

City of Meridian, MS
Wastewater Master Plan

Figure 4.2

EXISTING LAND USE



CITY OF MERIDIAN

Legend

- Agricultural
- Central Business
- General Business
- Heavy Industrial
- High Density Residential
- Light Industrial
- Medium Density Residential
- Neighborhood Business
- Professional Business
- Public Use
- Regional Business
- Residential-Business
- Single Family Residential
- Vacant

N

0 5,000 Feet

City of Meridian, MS
Wastewater Master Plan

Figure 4.3

FUTURE LAND USE TYPE

carollo

Table 4.1 Existing and Future Land Uses
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Land Use Type	Area (ac)		Percent Change
	Existing	Future	
Agricultural	50	3,040	5,980
Single Family Residential	3,931	9,072	131
Medium Density Residential	565	618	9
High Density Residential	30	779	2,497
Central Business	375	189	-50
General Business	569	1,011	78
Neighborhood Business	178	498	180
Professional Business	72	103	43
Regional Business	429	1,811	322
Residential Business	35	52	49
Heavy Industrial	318	1,364	329
Light Industrial	339	1,525	350
Public Use	852	5,654	564
Vacant	5,162	2	-100
Total	**12,905**	**25,718**	-

Percent change: (future land area minus existing land use area) times 100 divided by existing land use area

4.2 NETWORK MODEL DEVELOPMENT

In general, collection system models can assess the current level of performance for the collection system based on population and land use. Also, collection system models can perform “what if” scenarios to project the performance of future developments or population and land use changes. XP-SWMM and InfoWorks software were used to model the City’s collection system.

The collection system model includes the City’s pipelines with diameters of ten inches or greater, all associated manholes, diversion structures, and two pump stations. GIS data provided by the City was entered into the hydraulic model. This data includes pipe length, diameters, invert elevations, and rim elevations.

The City’s service area was divided into sub basins for both existing and future conditions. Each sub basin has an associated amount of residential and commercial flow that enters the collection system through a pipe within or close to the sub basin. The residential and commercial flows were determined from the land use flow rates taken from the City’s Municipal Code and General Plan.

Model calibration is a crucial component of the hydraulic modeling effort. Calibrating the model to known flow metering data is to ensure the most accurate results possible. The calibration process consists of calibrating to both dry and wet weather flow events. Dry weather flow calibration ensures an accurate depiction of base flow generated within the study area, based on population estimates and land use. The wet weather flow calibration consists of calibrating the hydraulic model to a specific storm event to quantify the peak and volume of inflow and infiltration into the collection system. The flows measured from 04/13/2006 through 04/19/2006 were averaged to provide typical dry weather flow conditions to calibrate the model during dry weather flow. For wet weather conditions, the hydraulic model was calibrated to the storm events occurring on March 20, 2006, April 21, 2006 and April 30, 2006.

The calibration process compares the flow metering data with the model output. Comparisons are made for minimum, maximum and average flows as well as the temporal distribution of flow. The dry and wet weather flows injected into the model are calibrated to each flow meter and its tributary pipes in order to match the peak and volume of the flow monitoring data chosen for calibration. Wet weather flow calibration also entails adjusting inflow and infiltration parameters within the model to match the flow monitoring data for each meter during the wet weather rainfall event.

The City’s sewer collection system was modeled to determine if the current collection system capacity is sufficient for existing conditions and future growth. The model calculates sanitary sewer system flows for existing and future conditions based on land use, population and RDII, and compares the flows to the capacity of each modeled pipe in the system. Pipe segments whose calculated capacity is less than their predicted peak flow are identified in this report as “deficient” or “inadequate”.

To keep the amount of input data manageable and to focus on the primary wastewater transmission and interceptor lines, the model considered only pipelines 10 inches or more in diameter. Some 8-inch diameter pipelines critical to the evaluation of certain collection system areas were added to the model as needed. The modeled system is shown on Figure 4.4. The modeled system consists of approximately 65 miles of pipeline.

4.2.1 Collection System Model

The hydraulic model was developed by importing network components directly from the City's GIS coverage's. The extents of the hydraulic model are shown in Figure 4.4. Only the major segments of the piped system were included in the model, which includes approximately 1,025 MHs, 1,440 pipe segments, and 2 pump stations. Lift station capacity, number of pumps, and pump on and off levels were obtained from available design documents.

4.2.1.1 Model Input Data

The basic information required to develop the hydraulic model can be grouped into two categories; sewer physical data and flow input data. The sewer physical data includes sewer size, sewer invert elevation at manholes, manhole top elevation, location of manholes and roughness of sewer pipe. These data were obtained using sewer maintenance records supplemented by as-built drawings and the City sewer map. Where critical data was missing, field surveys were conducted.

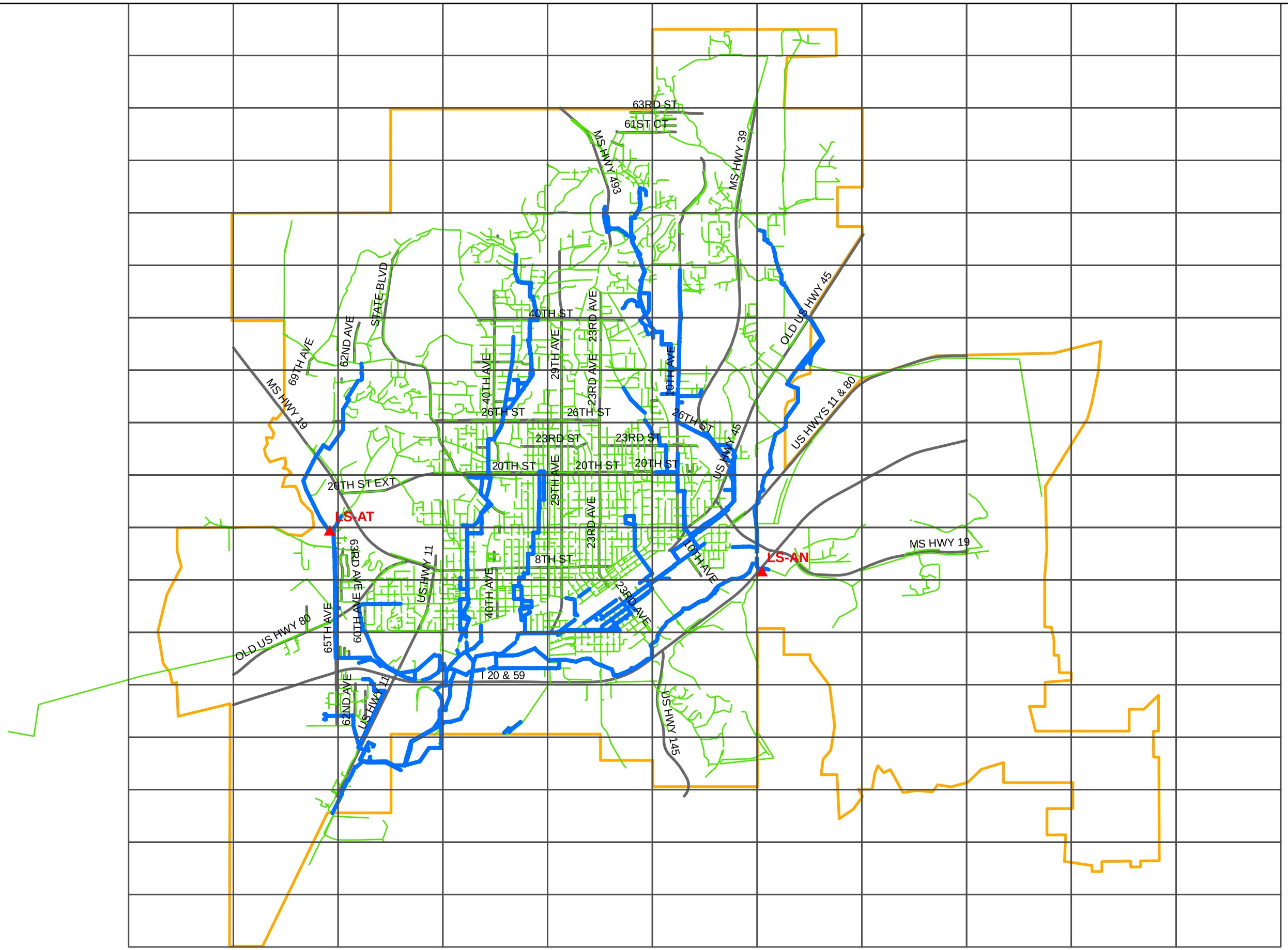
4.2.1.1.1 *Pipe Roughness*

A primary factor affecting a pipe's capacity is the roughness of its interior surface. Empirical testing over many years has established a series of roughness coefficients to characterize the relative smoothness of different types of piping. One such coefficient, called Manning's n-value, was incorporated into pipe capacity formulas for the computer model. The Manning's n-values in the model range from 0.014 to 0.018.

4.2.1.1.2 *Sub Basins and Model Loads*

Wastewater inflows used in the model were based on the City's existing land use and zoning maps, flow monitoring results and model calibration. Sub basins provide a method to estimate and apply loads to the collection system model. Each sub basin represents a defined area in which all businesses and residents apply loads to the system. Based on existing sanitary sewer alignments, sub basins were established throughout the service area. Loads were applied to the model at sub basin loading point.

A total of 188 sub basins and 174 load points were established to provide an estimate of a service area for each sewer line under existing conditions. The existing sub basins were modified to account for potential growth areas to derive the future sub basins.



Legend

- Map Grid
- Modeled Lift Station
- Modeled Pipe
- Non-Modeled Pipe
- Streets
- City Limit

N

0 5,000 Feet

City of Meridian, MS
Wastewater Master Plan

Figure 4.4 **Collection System Layout**

4.2.2 Model Analysis Tools

Various modeling tools are needed to address a wide variety of modeling objectives. These objectives require different levels of detail and the ability to model the system performance over a wide range of time periods. Because of the spatial detail required and the time scales of interest, the conveyance system modeling has two main components:

- Sub basin flow generation model; developed using XP-SWMM software.
- Dynamic hydraulic model of the conveyance system; developed using InfoWorks software.

The XP-SWMM model software was used to develop the runoff model, which generates the Dry Weather Flow (DWF) for each sub basin. The program also computes the RDII components and adds these to the DWF to create sub basin wastewater hydrographs for the InfoWorks hydraulic model. InfoWorks then routes the sub basin wastewater hydrographs through the conveyance system to the wastewater treatment plant. The model also simulates the pump station operations as well as sanitary sewer overflow (SSO) discharges.

4.3 FLOW MONITORING

Sanitary sewer model flows for the City were derived from flow monitoring results. Flow monitoring is a critical part of any comprehensive collection system modeling effort. The flow monitoring data is necessary to correlate projected flow estimates, based on land use (and/or population projections) and flow factors, with actual or “real world” collection system flows, and make necessary flow adjustments in the hydraulic model. The flow monitoring program provided vital information on how the City’s collection system behaves under various loading conditions.

Pipeline Analysis, LLC (PA) conducted the flow monitoring program. PA installed twenty-nine flowmeters and nine rain gauges for the period between March 2006 and May 2006. The twenty-nine flowmeters were located to monitor isolated flow emanating from each of the basins monitored. The locations of the flowmeters are presented in Figure 4.1. The flow monitoring sites were selected to provide flow data in critical sewer sections throughout the service area. Flow monitoring sites need to be readily accessible, and the flow stream should approximate a fairly quiescent sub-critical flow situation.

The flow monitoring results were adequate for model calibration and characterization of the system RDII response under average wet-weather conditions. However, the flow monitors did not capture any extreme storm events. Extreme rainfall events are those that have a 5-year or greater return frequency.

The flow meters defining flow from each basin are presented in Table 4.2. In the table, the Cumulative Flow is the average volume recorded at the meter site and the “Discrete Flow” is the “Cumulative Flow” volume less the flow contribution from up stream meter basins. The table indicates that DWF production per unit area is highest in Basin 29, which generates approximately 2,000 gpd/ac. Basin 30 generates the least DWF per acre of land.

Table 4.2 Summary of Flow Monitoring Results
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Basin ID	Up Stream Meter Basins	Dry Weather Flow[1] (mgd)[2]		Basin DWF Rate (gpd/ac)
		Cumulative	Discrete	
2	FM 3 & FM 4	1.39	1.00	563
3	None	0.07	0.07	232
4	FM 5	0.32	0.10	151
5	FM 6	0.22	0.04	86
6	None	0.18	0.18	179
7	None	0.02	0.02	73
8	FM 9 & FM 10	0.88	0.53	574
9	None	0.07	0.07	141
10	FM 11	0.28	0.22	382
11	None	0.06	0.06	74
12	None	0.27	0.27	866
13	FM 14	0.96	0.00	0
14	FM 15	1.06	0.64	1,525
15	FM 15	0.42	0.42	426
16	FM 17, FM 29, FM 27, FM 25, FM 23 & FM 21	2.41	0.44	970
17	FM 19 & FM 18	0.51	0.29	1,316
18	None	0.04	0.04	228
19	FM 20	0.18	0.13	622
20	None	0.06	0.05	226
21	FM 22	0.22	0.06	569
22	None	0.16	0.16	538
23	FM 24	0.30	0.09	284
24	None	0.21	0.21	606

Table 4.2 Summary of Flow Monitoring Results
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Basin ID	Up Stream Meter Basins	Dry Weather Flow[1] (mgd)[2]		Basin DWF Rate (gpd/ac)
		Cumulative	Discrete	
25	FM 26	0.33	0.24	758
26	FM 26	0.09	0.09	168
27	FM 27, FM 7 & FM 30	0.26	0.06	302
28	FM 28	0.11	0.11	148
29	FM 29	0.35	0.35	1,977
30	FM 30 & FM 28	0.18	0.07	221
Total		**-**	**6.01**	

(1) DWF = Dry Weather Flow based on average of April 13 through April 19, 2006

(2)mgd = million gallons per day

FM: Flowmeter

4.3.1 Wastewater Flow Components

Typically, wastewater consists of three components: base wastewater flow (BWF), groundwater infiltration (GWI), and rainfall dependent inflow and infiltration (RDII). BWF and GWI during dry weather constitute dry weather flow (DWF). GWI occurs when groundwater levels are above the inverts of the collection system pipes and when the collection system has faulty joints or other defects that allow infiltration. Sewer pipes within close proximity to a body of water can be greatly influenced by groundwater effects. RDII occurs during wet weather conditions and causes wastewater flow to increase.

4.3.1.1 Base Flow Projections

BWF is sanitary flow generated from residential, commercial, industrial, and public or institutional sources that discharge into the wastewater collection system. It may vary in magnitude throughout the day, but generally follows a predictable and repeatable diurnal pattern with peak flow usually occurring during the morning hours.

Unit flow rates were determined for all major land use designations; single family residential, multi-family residential, commercial, and industrial as part of the BWF calculations. The City's land use categories identified in the parcel and zoning maps were consolidated for use in developing the flows. The distribution of these land uses is shown in Figure 4.2 and 4.3.

4.3.1.1.1 *Residential Unit Flow Rates*

Residential unit flow rates were developed using the 2006 flow monitoring data, the zoning map, and the City parcel map. The unit flow rates (gpcd) for existing conditions were initially selected based on our experience with similar cities and later refined through iterative techniques. For each land use category, the total number of houses or tax lots (units) per acre of land was determined. An average household size of 2.75 persons per house was assumed for residential categories. The average household size (persons/unit) multiplied by the number of houses or units per acre in each land use category yielded a total population per acre (i.e. population density). The area flow rate (gpd/acre) for each land use category was then determined by multiplying by the population density by the unit flow rate (gpcd).

The future residential area flow rates were assumed to be 1.2 times the area flow rates calculated for the existing conditions. Table 4.3 lists the existing and future unit rates used to generate BWF.

4.3.1.1.2 *Commercial and Industrial Unit Flow Rates*

The commercial and industrial unit flow rates were selected based on our experience with similar cities and later refined through iterative techniques. These rates listed in Table 4.3 are close to typical rates of commercial and industrial flows that can vary from 800 to 1,500 gpd/acre (*Wastewater Collection System Modeling and Design*, First Edition, Haestad Methods et al., 2004). However, commercial and industrial rates can vary greatly depending on the type of activity that affects intensity of use, low flow fixtures, local water rates, etc.

Table 4.3 Summary of Flow Monitoring Results
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Land Use Type	Persons per Unit	Units per acre	Persons per acre	Unit Flow Rate (gpcd)		Area Flow Rate (gpd/acre)	
				Existing	Future	Existing	Future
Residential							
Single Family Residential	2.75	2	5.50	73	88	400	484
Medium Density Residential	2.75	5	13.75	69	83	950	1,141
High Density Residential	2.75	10	27.50	65	78	1,800	2,145
Non-Residential							
Central Business						3,000	3,600
General Business						2,000	2,400
Neighborhood Business						900	1,080
Professional Business						2,000	2,400

Table 4.3 Summary of Flow Monitoring Results Wastewater Collection System Rehabilitation Program City of Meridian, MS			
Regional Business		2,200	2,640
Residential Business		900	1,080
Heavy Industrial		720	864
Light Industrial		400	480
Public		22	26

4.3.2 Groundwater Infiltration (GWI)

GWI is groundwater that infiltrates into the sewer system through defects in manholes and pipes. GWI rates vary depending on time of year, the condition of the sewers, soil type, and groundwater levels. However, GWI rates stay fairly consistent throughout the day. GWI was calculated as the difference between metered DWF and BWF at each flow meter basin. The calculated GWI was applied evenly as a flow per acre to the entire area upstream of each flow meter. Table 4.4 summarizes the modeled GWI flow that was used for each basin. The GWI loads were later re-evaluated and adjusted during final calibration of the dry weather flow model.

For future areas, GWI was calculated by identifying the sub basin the future land is located. To calculate the GWI the corresponding GWI rate was multiplied by the future land area. Table 4.4 below shows the calculated BWF and GWI rates.

Table 4.4 Base Wastewater Flow and Groundwater Infiltration
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

	Flow (mgd)			Flow (mgd)			Flow (mgd)	
Site	BWF	GWI	Site	BWF	GWI	Site	BWF	GWI
2	0.840	0.160	12	0.183	0.087	22	0.105	0.055
3	0.051	0.019	13	0.008	0.001	23	0.078	0.012
4	0.087	0.013	14	0.472	0.168	24	0.149	0.061
5	0.024	0.016	15	0.221	0.199	25	0.156	0.084
6	0.155	0.025	16	0.290	0.150	26	0.065	0.025
7	0.018	0.002	17	0.195	0.095	27	0.050	0.010
8	0.345	0.185	18	0.036	0.004	28	0.08	0.03
9	0.049	0.021	19	0.099	0.031	29	0.171	0.180

Table 4.4 Base Wastewater Flow and Groundwater Infiltration Wastewater Collection System Rehabilitation Program City of Meridian, MS								
	Flow (mgd)			Flow (mgd)			Flow (mgd)	
Site	BWF	GWI	Site	BWF	GWI	Site	BWF	GWI
10	0.131	0.091	20	0.039	0.011	30	0.055	0.015
11	0.042	0.018	21	0.047	0.013			
DWF = BWF + GWI								

4.3.3 Rainfall Dependent Inflow and Infiltration (RDII)

RDII consists of stormwater entering the collection system either as direct inflow of stormwater runoff or rainfall induced infiltration. Inflow occurs when stormwater flows directly into the collection system through connected catch basins, manhole covers, area drains, or downspouts. Inflow usually occurs very rapidly during a storm event and can become more severe if surface flooding occurs and manholes are submerged. Rainfall induced infiltration is caused by stormwater percolating through the ground and entering the sewer pipes, manholes, and service laterals through cracks and defective joints.

Analysis of RDII requires a method to relate sewer flows to rainfall. Methods in use are documented in the Water Environment Research Foundation project report *Sanitary Sewer Overflow Flow Prediction Technologies*, Project, April 1999. The Rainfall-Flow Regression Method and true hydrologic method are two commonly methods often considered.

The Rainfall-Flow Regression method estimates RDII based upon a relationship developed using multiple linear regressions to associate rainfall summed over various antecedent periods to observed RDII flow. Due to the available data quality and quantity, the Rainfall-Flow Regression Method was not considered in this study.

True hydrologic method was used in this analysis. This approach can be used to estimate basin response to any arbitrary rainfall condition. A runoff model was developed to simulate the response of the sanitary collection system to sanitary, groundwater, hydrologic, and rainfall derived flows. Once calibrated, the model can be used with a long-term local rainfall record or design storms to simulate the RDII and total flows that would be expected at every hour of that rainfall record. With this method, there is increased confidence that the response of the system is accurately estimated. This confidence, however, is predicated on the ability of the model to predict peak flows beyond the range of rainfall conditions experienced in the monitoring periods. Confidence is increased with longer monitoring and a greater variation in rainfall events during that monitoring period.

4.4 MODEL CALIBRATION

Model calibration is a crucial component of the hydraulic modeling effort. Model calibration to known flow metering data is necessary to provide more accurate modeling results. The calibration process consists of calibrating to both dry and wet weather flow events. Dry weather flow calibration ensures an accurate depiction of base wastewater flow generated within the study area, based on land use. The wet weather flow calibration consists of calibrating the hydraulic model to a specific storm event to quantify the peak and volume of inflow and infiltration into the collection system. The amount of inflow and infiltration allowed to enter the collection system is essentially the difference between the wet weather flow and dry weather flow components.

4.4.1 Dry Weather Flow Calibration

Calibration under dry weather flow conditions was performed to verify the base flow generated. The calibration was performed at each flow monitoring location using data from the 2006 monitoring program. The dry weather calibration period is based on monitored flows occurring from 04/13/2006 through 04/19/2006. The primary goal of the calibration was to match the volume of flow generated in the model with the volume measured during the monitoring period. The secondary goal was to match the average dry weather flow pattern between the data sets.

GWI and BWF rates were added to each loading manhole (flow insertion point) and run through the XP-SWMM model. The dry weather calibration process required the adjustment of BWF and GWI parameters so the peaks and valleys of the diurnal curve would match dry weather flow monitoring data gathered for this project. A closely calibrated model consists of diurnal curves (model) peaking consistently with diurnal with diurnal curves developed through flow monitoring process.

Adjustments were made to BWF loads within each sub basin so that the peaks and valleys of the diurnal curves matched the observed flows recorded by the respective flow meter. Judgment was used to evaluate and modify the initial loads throughout the service area. Several iterative simulations were executed during the model calibration.

After the residential, commercial and industrial flows were determined, diurnal curves were created for all pipes tributary to a specific flow meter. The diurnal curves depict the time variation of base flow throughout a 24-hour period. Usually, peaks in a diurnal curve will occur in the morning between 8 a.m. and 10 a.m., and again in the evening between 6 p.m. and 8 p.m. Using the flow data measured during the monitoring period, an average diurnal curve was developed for each flowmeter basin.

The dry weather diurnal curves were developed using five days of dry weather that were preceded by dry weather periods of at least a few days. These days fell between 04/13/2006 and 04/19/2006. The dry weather flow pattern was based on metered flows occurring every 15 minutes (pattern time step in the model) over a 24-hour period (duration in model). The dry weather pattern was considered uniform throughout the sewer system upstream of the flow monitoring point.

Consequently, sanitary base loads upstream of the calibration points were adjusted by the dry weather pattern for the dry weather calibration.

The results of the dry weather flow calibration are shown in Table 4.5. Graphical results for two flow monitoring sites are presented in Figures 4.5 and 4.6. Similar analyses were completed for all flowmeter basins and are presented in Appendix 2.

Table 4.5 Dry Weather Flow Calibration Results
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Site	Average Flow (mgd)		Absolute Error (%)	Site	Average Flow (mgd)		Absolute Error (%)	Site	Average Flow (mgd)		Absolute Error (%)
	Actual	Model			Actual	Model			Actual	Model	
2	1.390	1.405	1.08	12	0.270	0.268	0.74	22	0.160	0.162	1.25
3	0.070	0.070	0.00	13	0.960	1.002	4.38	23	0.300	0.305	1.67
4	0.320	0.317	0.94	14	1.060	1.055	0.47	24	0.210	0.212	0.95
5	0.220	0.218	0.91	15	0.420	0.421	0.24	25	0.330	0.328	0.61
6	0.180	0.182	1.11	16	2.410	2.45	1.66	26	0.090	0.089	1.11
7	0.020	0.021	5.00	17	0.510	0.515	0.98	27	0.260	0.262	0.77
8	0.880	0.853	3.07	18	0.040	0.042	5.00	28	0.11	0.111	0.91
9	0.070	0.072	2.86	19	0.180	0.178	1.11	29	0.350	0.351	0.29
10	0.280	0.276	1.43	20	0.050	0.051	2.00	30	0.180	0.177	1.67
11	0.060	0.062	3.33	21	0.220	0.217	1.36				

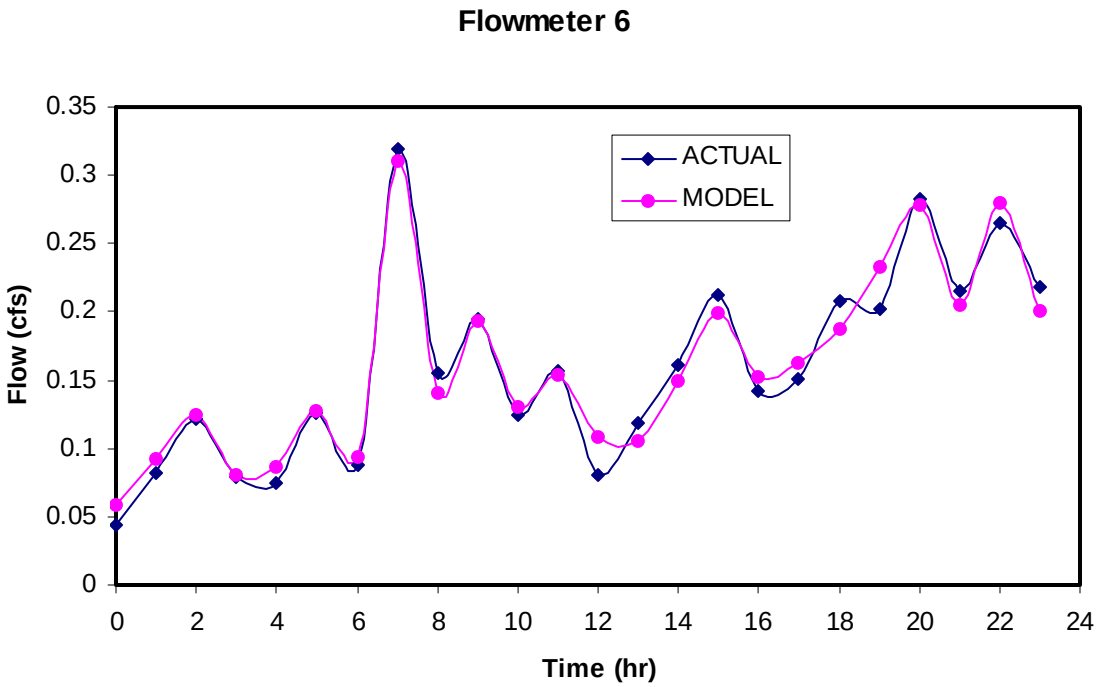


Figure 4.5 Comparison of Modeled and Actual Flow - Flowmeter 6

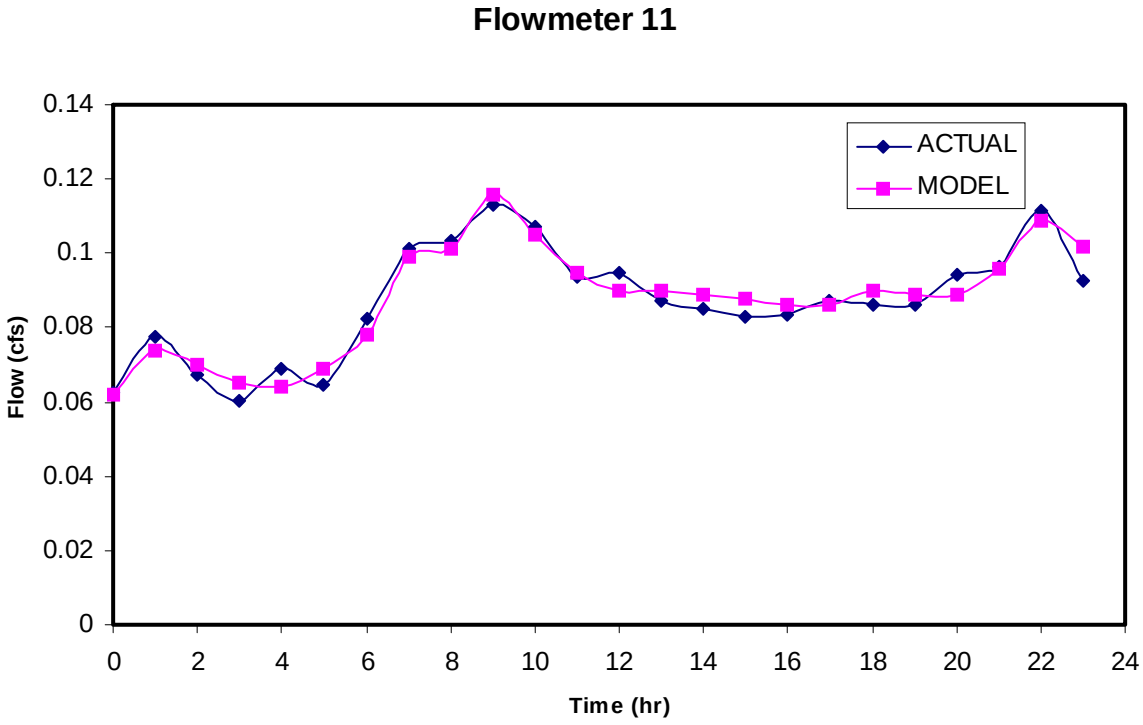


Figure 4.6 Comparison of Modeled and Actual Flow - Flowmeter 11

4.4.2 Wet-Weather Flows

The wet weather calibration involves simulation of observed rainfall data to produce a hydrograph of flow and manhole hydraulic grade line (HGL) for the conduit containing the monitoring equipment. The model output is then graphically compared to observed data.

The wet weather flow calibration begins with the development of runoff model to estimate RDII. The XP-SWMM software was used to develop the runoff model to simulate the response of the sanitary collection system to sanitary, groundwater, and rainfall derived flows. Once constructed and calibrated, the runoff model was used to project flows under wet weather conditions for existing conditions.

4.4.2.1 Runoff Modeling Approach

Simulating RDII using XP-SWMM runoff requires the specification of sub basin characteristics that result in correct RDII. These sub basin characteristics do not have any physical significance, but they allow simulation of RDII using runoff calculation formulations. The parameters specified include sub basin area and percent imperviousness. The sub basin area was calculated as the surface area of the sewer tributary area to the inflow point in the model. The percent imperviousness is used to represent the ratio of RDII volume in feet to rainfall depth in feet. The percent imperviousness is a dimensionless parameter and is equivalent to runoff coefficient.

The percent imperviousness value was determined by analysis of flow monitoring data. After separating the rainfall-induced flow for a number of storms, RDII volumes were calculated and plotted versus rainfall depth. The slope of the correlation line gives an estimate of the percent imperviousness. Typically, a sanitary sewer system in good condition will have percent imperviousness values of less than 0.01. Approximately, fifty percent of the flow monitoring sites have percent imperviousness values greater than 0.01.

The ultimate goal of the wet weather flow calibration was for the modeled data to match the storm peaks from the 2006 flow monitoring data. To avoid significant errors in projection the model was calibrated over approximately one full wet season of flow data. It is highly probable that flows measured in such conditions will reflect the peaks that can occur under wet antecedent conditions. The storm event used for wet weather calibration occurred on March 20, 2006, April 21,2006 and April 30, 2006. Once the model was loaded with existing BWF, GWI and RDII, the hydraulics were analyzed to verify that the correct peak flows were being predicted at each flow monitor location. Parameters such Manning's roughness coefficient, infiltration parameters and sub basin width were adjusted to calibrate the model.

Figures 4.7 and 4.8 compare the observed and modeled flows for two monitoring sites. The calibration results show a reasonable agreement between observed and modeled flows at all the flow monitoring sites.

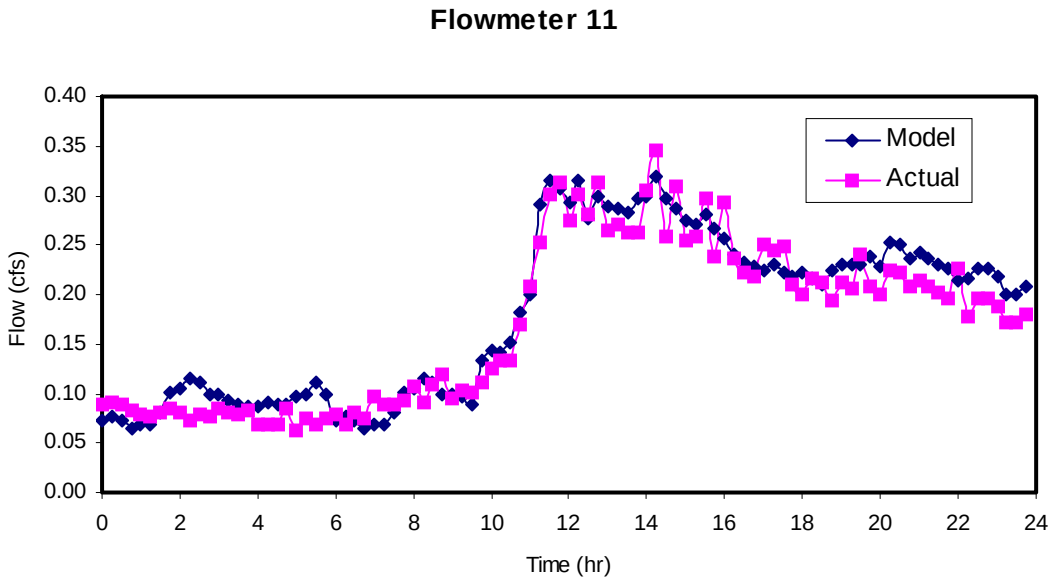


Figure 4.7 Wet Weather Flow Calibration Results (04/30/2006) - Site 11

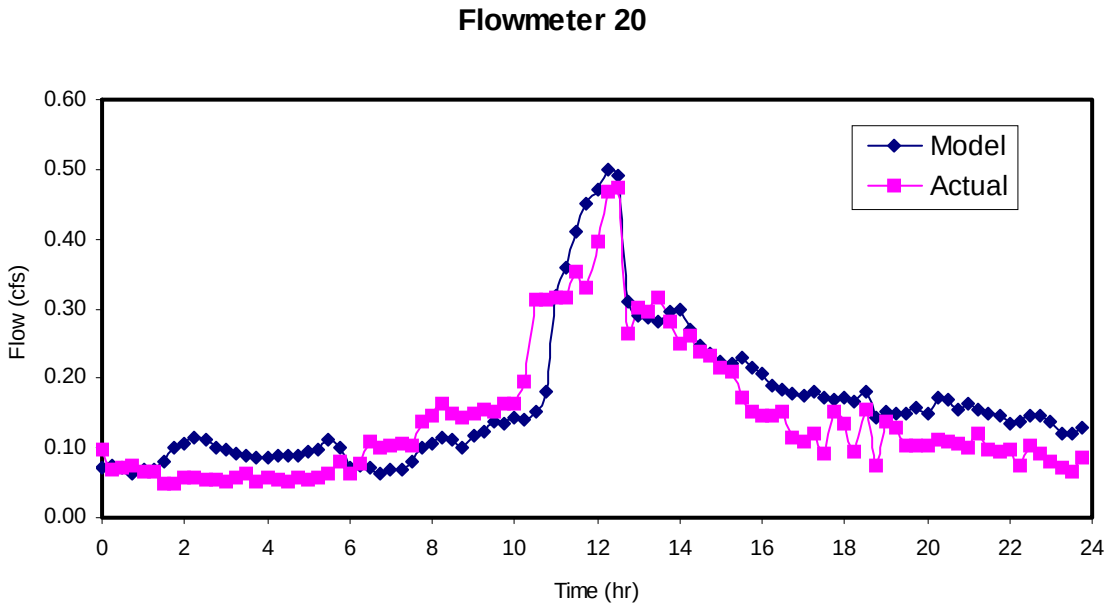


Figure 4.8 Wet Weather Flow Calibration Results (04/30/2006) - Site 20

4.5 CAPACITY ANALYSIS

A capacity analysis of the modeled collection system was performed upon completion of the dry and wet weather flow calibrations. The capacity analysis entailed identifying areas in the collection system where flow restrictions occur or where pipe capacity is insufficient to pass peak wet weather flows. This section presents the results of hydraulic analysis of the existing collection system under existing and build-out flow conditions. Deficiencies in the City's service area were evaluated using a dynamic computer model. The model calculates sanitary sewer system flows for existing and future conditions based on land use, population, and RDII, and compares the flows to the capacity of each modeled pipe in the system. Pipe segments whose calculated capacity is less than their predicted flow are identified in this report as "deficient" or "inadequate." Based on the hydraulic analysis, a preliminary capital improvement program is developed.

4.5.1 Design Storm Selection

A design storm was developed to estimate the peak wet weather flow in the system and to provide information to perform the capacity analysis. Design storms are "synthetic" rainfall events based on historical rainfall data used to analyze the performance of a collection system under peak flows and volumes. The design storm has a specific recurrence interval and rainfall duration. Development of a design storm is based on rainfall intensity, pattern, and volume. Analysis of these parameters is crucial in providing a realistic design storm for the City, thus a higher design standard for the collection system is an inefficient use of resources. Based on U.S. Department of Agriculture, Soil Conservation Service Technical Publication 40, (TP 40), rainfall intensity-duration and frequency curves were developed for the City of Meridian. These curves were used to estimate the frequency of the measured rainfall data. Appendix D contains detailed description on the development of the design storms for this analysis. The rainfall intensity-duration relationships developed for the Meridian area are presented in Table 4.6.

Table 4.6 Rainfall Depth - Duration - Frequency Relationship Wastewater Collection System Rehabilitation Program City of Meridian, MS

Return Period	Rainfall Intensity (in/hr)						
	30 Min	1 Hr	2 Hrs	3 Hrs	6 Hrs	12 Hrs	24 Hrs
1	2.90	1.80	1.10	0.80	0.47	0.28	0.18
2	3.30	2.10	1.25	1.10	0.58	0.35	0.20
5	4.20	2.60	1.60	1.17	0.75	0.43	0.26
10	4.40	2.80	1.85	1.33	0.83	0.51	0.30
25	5.20	3.20	2.00	1.50	0.98	0.59	0.33
50	5.60	3.60	2.25	1.67	1.13	0.68	0.37
100	6.40	3.80	2.50	1.83	1.18	0.75	0.43

The rainfall periods used to calibrate the hydraulic model occurred on April 30, 2006, April 4, 2006 and April 30, 2006. During these periods, the greatest continuous 24-hour volume was less than the 5-year storm event determined by statistical analysis. However, additional analysis was performed on historic dry and wet weather flow data. Based on this data, it was determined that the calibration storm was approximately a 5-year storm event.

4.5.2 Collection System Model Analysis

The collection system was modeled and analyzed using the 5-year 24-hour design storm to determine the system capacity deficiencies. The capacity analysis was performed for the existing land use condition and the build-out scenario. Within the model, the design storm produces RDII flows. A combination of RDII and dry weather flows is routed through the collection system hydraulic model. The hydraulic model determines which pipelines in the collection system are unable to convey the peak wet weather flows caused by the design storm.

4.5.2.1 Hydraulic Evaluation Criteria

The hydraulic evaluation criteria present the guides used to evaluate the existing collection system. Using these guides, solutions were formulated for each alternative by solving conveyance and overflow problems in the collection system. These guides consist of design objectives, design criteria and physical constraints. Using these guides, capital improvements were developed and cost estimates completed as presented in this report.

4.5.2.1.1 *Existing and Future System Evaluation Criteria*

The capacity and performance of the existing system and future system scenarios was evaluated based on the following criteria:

- Pipe surcharge: Pipe surcharge occurring during the 5-year wet weather event design conditions should be eliminated. Under dry weather conditions, a depth to diameter (d/D) value less than 50 percent is desirable. Under the 5-year wet weather design conditions, a d/D ratio should not exceed 100 percent. Capacity limiting problems were identified at all pipes that exceeded these threshold values. Siphons and adjacent pipes are noted as exception to this rule.

- Sanitary sewer overflows (SSOs): Sanitary sewer overflows occurring during the 5-year wet weather design conditions should be eliminated. SSOs are noted as “flooding” or “flooded structures” in the model.

- Pipe Velocity: Flow velocities should be maintained between 2 and 10 feet per second (fps). Velocities less than 2 fps could cause solids to settle out of the wastewater and that could lead to clogged pipes and system backups. Additionally, an accumulation of solids may trap organic solids, increase detention time and promote sulfide generation. Velocities greater than 10 fps require special protection against erosion and impact. Flow velocities were evaluated under dry and wet weather conditions.

Sewer reaches exhibiting less than minimum velocity in the model was not used as a sole criterion to "trigger" pipe reaches with hydraulic problems for two reasons. First, sewers exhibiting less than minimum velocity but are not surcharged have sufficient hydraulic capacity to pass the design storm flows. Second, correcting the minimum velocity problem requires constructing a new larger pipe and/or increasing the pipe slope. Replacement of a sewer pipe that otherwise has sufficient hydraulic capacity simply to resolve a minimum velocity and potential solids deposition problem is very costly. Solids deposition can be controlled by preventive maintenance at a much lower cost than reconstructing portions of the collection system.

The options of replacement and upsizing of existing sewers was considered in all situations and implemented where deemed appropriate.

4.5.2.2 Model Scenarios

The collection system was evaluated to identify inadequacies and problem areas. The system capacity was evaluated to determine what pipe or pump was potentially limiting collection system efficiency. Evaluation of the efficiency of the collection system was based on capacity of the pipes under dry weather and wet weather flow conditions. Capacity was illustrated using a d/D ratio. Velocity related problems were also identified.

A total of four model scenarios were developed to analyze the City's sewer collection system. These model scenarios are summarized below in Table 4.7.

Table 4.7 Model Scenarios
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Scenario	Description
EX-DWF	Exiting conditions dry weather flow
EX-WWF 5-YR-24 HR-SCS II	Existing condition wet weather flow 5-year, 24-hour SCS Type II Storm Inflow and Infiltration
FUT-DWF	Future conditions dry weather flow
FUT-WWF 5-YR-24 HR-SCS II	Future condition wet weather flow 5-year, 24-hour SCS Type II Storm Inflow and Infiltration

4.5.2.3 EX-DWF Results

The existing system was evaluated under dry weather flow conditions to identify inadequacies and problem areas. The model was examined during the daily peak hour, which occurred daily at approximately 9:00 a.m.

Model simulations of the existing conditions indicated that SSOs did not occur during dry weather flows. All pipes were running well below maximum capacity. Under dry weather flow, a general rule-of-thumb says the d/D ratios should be less than 0.5.

Low flow velocities were abundant under dry weather flow conditions. Velocities greater than 2 fps occurred in approximately 59,602 feet or 18 percent of the modeled pipes. Locations of pipes with velocities less than 2 fps are shown on Figure 4.9. Results of the monitoring program indicated low flow velocities were a constant problem in much of the system. High flow velocities exceeding 10 fps did not cause problems under dry weather flow conditions.

4.5.2.4 EX-WWF 5-YR-24 HR-SCS II Results

The model was run under wet weather design flows to assess capacity, SSOs and velocity related problems. Design flow conditions from a 5-year, 24-hour SCS Type II design storm were applied to the dry weather flows. The model was examined during the design flow peak hour, which occurred between model hour 12:00 and 13:00. At this time, the peak flow from the design storm produced the maximum hydraulic stress to the system.

The model results indicate that no SSOs occurred under the 5-year, 24-hour SCS Type II design storm conditions. Pipe with d/D values that exceeded 1.0 are listed in Table 4.8 and the relative locations of these pipes are displayed in Figure 4.10.

System velocities were evaluated under wet weather flow conditions. Flow velocities less than 2 fps or greater than 10 fps were found to be a problem under wet weather design flow conditions.

4.5.2.5 FUT-DWF Results

The existing system was evaluated under future dry weather flow conditions to identify inadequacies and problem areas. The model was examined during the daily peak hour, which occurred daily at approximately 9:00 a.m.

Model simulations of the existing conditions indicated that SSOs did not occur during dry weather flows. All pipes were running well below maximum capacity. Under dry weather flow, a general rule-of-thumb says the d/D ratios should be less than 0.5.

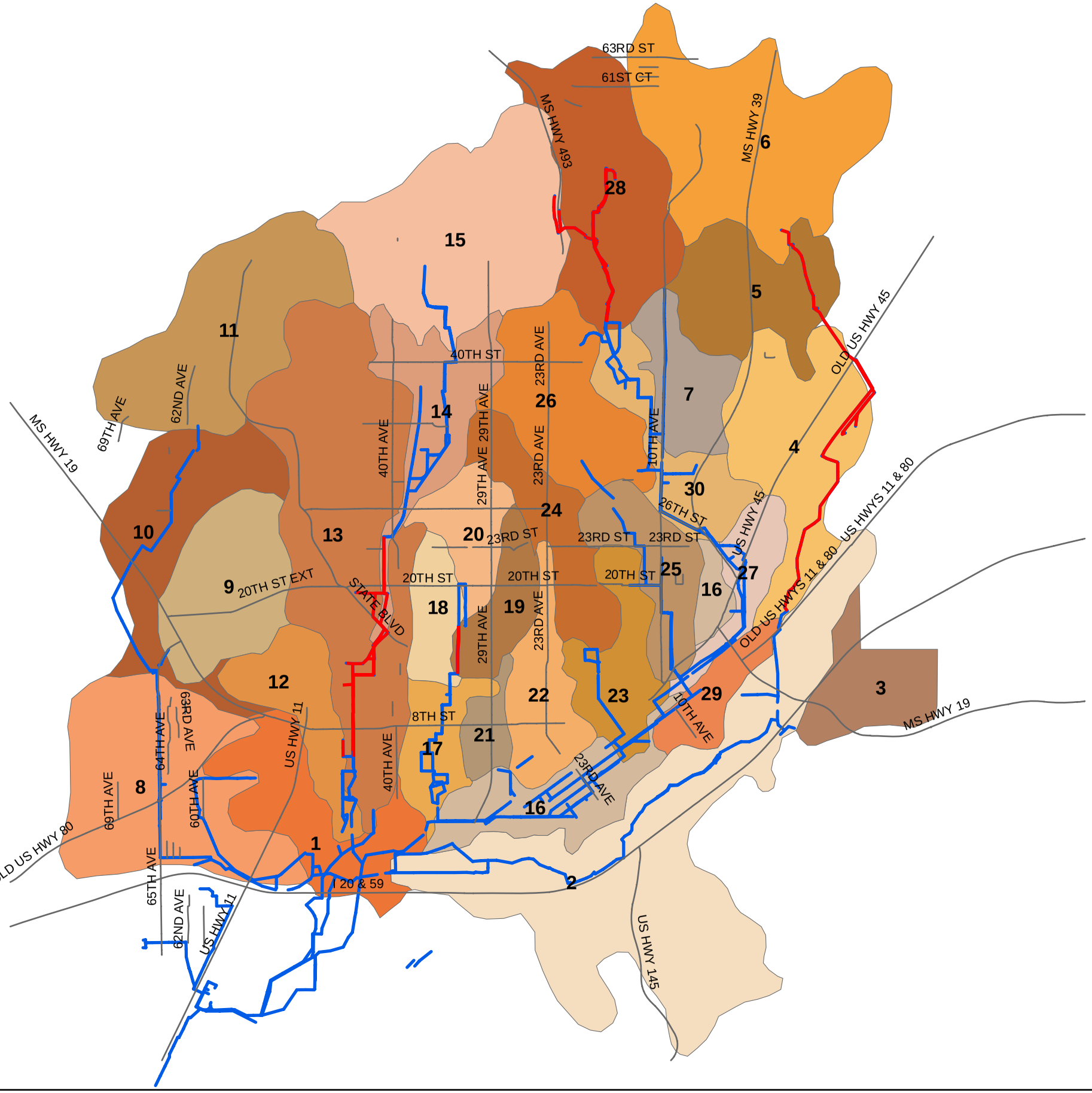
System velocities were evaluated under wet weather flow conditions. Flow velocities less than 2 fps or greater than 10 fps were found to be a problem under wet weather design flow conditions.

4.5.2.6 FUT-WWF 5-YR-24 HR-SCS II Results

The model was run under future wet weather design flows to assess capacity, SSOs and velocity related problems. Design flow conditions from a 5-year, 24-hour SCS Type II design storm were applied to the dry weather flows.

The model results indicate that no SSOs occurred under the 5-year, 24-hour SCS Type II design storm conditions. Pipe with d/D values that exceeded 1.0 are listed in Table 4.8 the relative locations of these pipes are displayed in Figure 4.10.

System velocities were evaluated under wet weather flow conditions. Flow velocities less than 2 fps or greater than 10 fps were found to be a problem under wet weather design flow conditions.



Legend

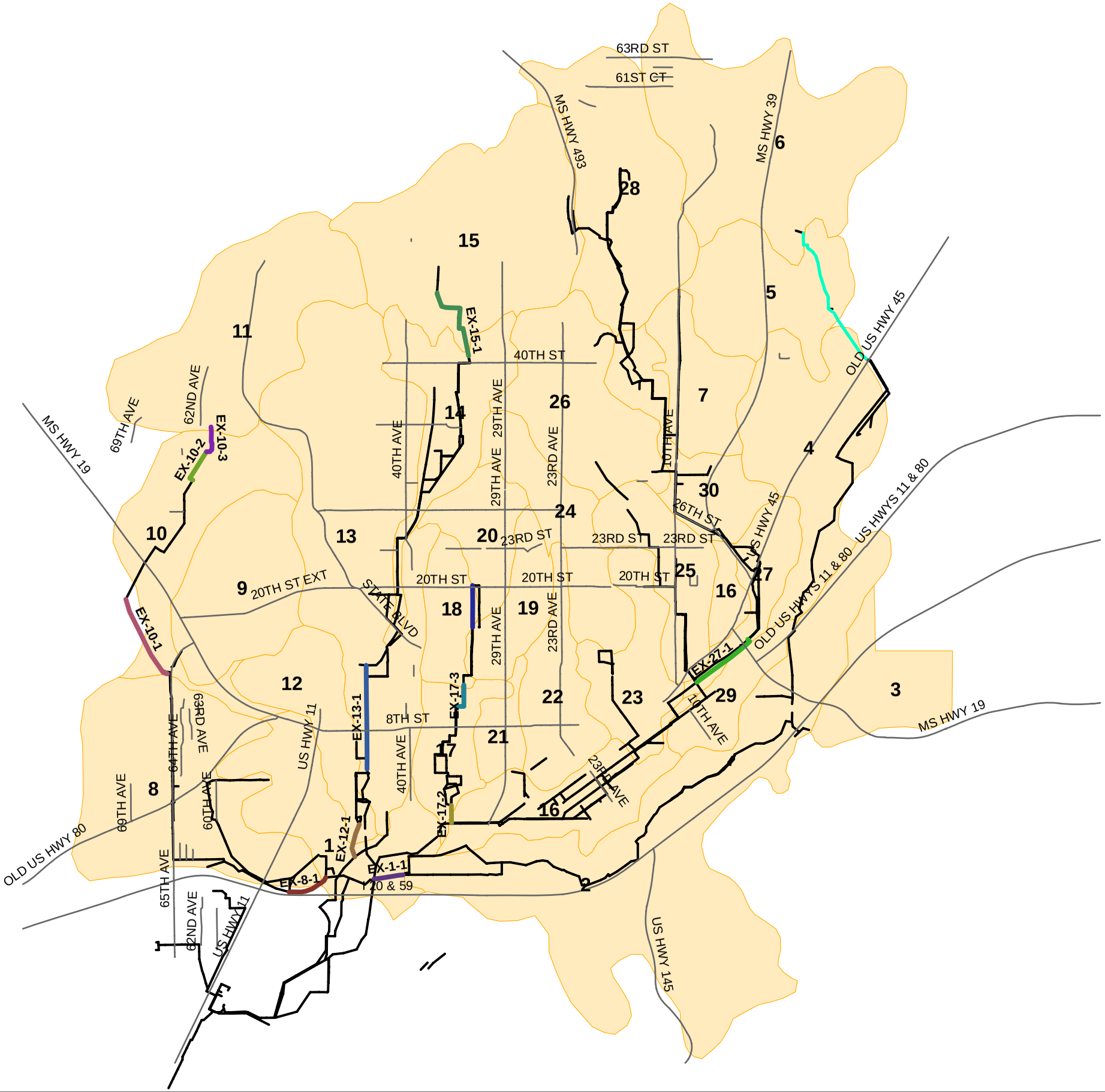
- Model Pipe
- Vel. Greater Than 2 fps
- Meter Basins

0 4,000 Feet

City of Meridian, MS
Wastewater Master Plan

Figure 4.9

DRY WEATHER FLOW VELOCITY DICTRIBUTION



Legend

- EX-8-1
- EX-27-1
- EX-18-1
- EX-17-3
- EX-17-2
- EX-17-1
- EX-15-1
- EX-13-1
- EX-12-1
- EX-10-3
- EX-10-2
- EX-10-1
- EX-1-1
- FUT-5-1
- Meter Basins

N

0 4,000 Feet

City of Meridian, MS
Wastewater Master Plan

Figure 4.10

CAPACITY DEFICIENT PIPES

Table 4.8 Hydraulically Deficient Pipe Segments
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Problem ID	Basin	Manhole		General Location	Diameter (in)	Length (ft)	d/D
		Upstream	Downstream				
EX-17-1	17	G27-179	G27-177	Along 34th Ave. between 12th St. and 11th St.	12	345.9	1.24
EX-10-1	10	E28-009	LS-AT	About 1,500 ft east of MS Hwy 19 and N. HILL St.	16	3119.0	1.47
EX-8-1	8	F25-036	F25-030	About 600 ft north of I29 and 49th St., between 5	24	1431.4	1.68
EX-10-2	10	F30-175	F30-158	East of Oak Dr. between Bounds Rd. and Spruce St.	10	1199.8	1.43
EX-10-3	10	F31-070	F30-185	300 ft east of Bounds Rd. and 62nd Ave. 17th St. a	10	999.6	1.35
EX-20-1	20	G29-032	G28-053	Along 33rd Ave., between 17th St. and 21st St.	10	1430.5	1.29
EX-12-1	12	G25-017	G25-015	East of 49th St., between 1st St. and Front Rd.	18	1164.5	1.21
EX-1-1	1	G25-043	G25-029	North of I20 between 49th Ave. and 31st Ave.	24	1005.6	1.16
EX-17-2	17	G26-268	G25-078	Along 36th Ave., between 2nd St. and Interchange	27	593.5	1.19
EX-27-1	27	I28-069	I27-080	North of 8th Ave., between B St. and US Hwy 45	15	2390.1	1.26
EX-13-1	13	G28-152	G26-128	Along 45th Ave., between 14th St. and 5th St.	24	3556.4	1.33
EX-17-3	17	G27-183	G27-163	Along 34th St. between 12th St. and 10th St.	12	1004.1	1.41
EX-15-1	15	G32-078	G31-131	Along 34th Ave., 35th Ave. and 36th Ave.	10	2927.1	1.27
FUT-5-1	5	J33-004	J31-050	Between N. Hills St. and Old US Hwy 45	10	5027.0	1.78

4.5.3 Existing System Recommendations

Recommendations are made for improvements to the existing system in order to eliminate problems identified. These recommendations include increase pumping capacity, increase conveyance capacity and implementation of a sewer-flushing program.

4.5.3.1 Pumping Capacity

The model results and a separate pump stations analysis shows the pump capacities of pump stations identified as LS-AN(Red Lobster) and LS-AT(65th Ave) should be increased to accommodate the existing design storm flows. Detailed analysis and recommendations for these pump stations are presented in section 3.

4.5.3.2 Conveyance Capacity

Increased conveyance is required in nine basins to eliminate system surcharge. When additional capacity is required, existing sewers can be replaced or paralleled. Most of the recommendations presented in this master plan are based on replacing existing undersized pipe with pipe sized to convey the projected peak flows. This is the preferred alternative for most undersized pipe

conditions. In some situations, other alternatives may be available, including basin (gravity and pumping) transfers, and the use of parallel pipes. The latter approach was not used in this master plan, but should be considered during pre-design if the existing pipe is determined to be in good condition.

For the purposes of this master plan, it was assumed that a deficient existing sewer would be replaced with a larger pipeline at the same slope as the existing pipeline. The criteria used to determine whether an existing pipeline should be replaced were based on the pipeline's capacity to convey peak wet weather flow during the 5-year, 24-hour design storm event.

Based on simulation results, a number of pipelines require improvements for existing and future conditions during the 5-year, 24-hour design storm. Several of the pipelines that require improvements for existing conditions will also require improvements during future conditions, albeit with a larger diameter. It is recommended that the larger diameter be constructed so that these pipelines will have sufficient capacity not only for existing but also for future conditions. A second phase of construction at a later date to account for deficiencies during future conditions would not be cost effective.

Table 4.9 presents a summary of the improvements required during existing and future conditions. The proposed pipe diameter represents the ultimate diameter in cases where further upsizing for build-out conditions was required.

4.5.3.2.1 *Basin 17*

Under existing conditions, majority of the sewer system modeled for the Basin 17 is hydraulically adequate. Three pipe segments; EX-17-1, EX-17-2 and EX-17-3 show surcharging conditions. The d/D values for these hydraulically deficient pipe segments ranged between 1.19 and 1.41.

Under future conditions, the analysis indicates the surcharging identified under existing conditions will increase but no risk of overflows. It is recommended that the three pipe segments be upsized as shown in Table 4.9.

4.5.3.2.2 *Basin 10*

Under existing conditions, three pipe segments; EX-10-1, EX-10-2 and EX-10-3 show surcharging conditions. The d/D for these hydraulically deficient pipe segments ranged between 1.35 and 1.47.

Under future conditions, the analysis indicates the surcharging identified under existing conditions will increase but no risk of overflows.

It is recommended that the three pipe segments be upsized as shown in Table 4.9.

4.5.3.2.3 *Basin 8*

Pipe segment EX-8-1, located between east of MS Hwy 19 and N. Hills St. is slightly surcharged under existing conditions. Simulation results indicate the surcharging will worsen under future flow conditions if no action is taken.

Table 4.9 Recommendations for Hydraulically Deficient Pipes
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Problem ID	Basin	Manhole		General Location	Diameter (in		Length (ft)
		Upstream	Downstream		Existing	Proposed	
EX-17-1	17	G27-179	G27-177	Along 34th Ave. between 12th St. and 11th St.	12	18	345.9
EX-10-1	10	E28-009	LS-AT	About 1,500 ft east of MS Hwy 19 and N. HILL St.	16	21	3119.0
EX-8-1	8	F25-036	F25-030	About 600 ft north of I29 and 49th St., between 5	24	30	1431.4
EX-10-2	10	F30-175	F30-158	East of Oak Dr. between Bounds Rd. and Spruce St.	10	18	1199.8
EX-10-3	10	F31-070	F30-185	300 ft east of Bounds Rd. and 62nd Ave. 17th St. a	10	18	999.6
EX-20-1	20	G29-032	G28-053	Along 33rd Ave., between 17th St. and 21st St.	10	18	1430.5
EX-12-1	12	G25-017	G25-015	East of 49th St., between 1st St. and Front Rd.	18	24	1164.5
EX-1-1	1	G25-043	G25-029	North of I20 between 49th Ave. and 31st Ave.	24	30	1005.6
EX-17-2	17	G26-268	G25-078	Along 36th Ave., between 2nd St. and Interchange	27	36	593.5
EX-27-1	27	I28-069	I27-080	North of 8th Ave., between B St. and US Hwy 45	15	24	2390.1
EX-13-1	13	G28-152	G26-128	Along 45th Ave., between 14th St. and 5th St.	24	36	3556.4
EX-17-3	17	G27-183	G27-163	Along 34th St. between 12th St. and 10th St.	12	21	1004.1
EX-15-1	15	G32-078	G31-131	Along 34th Ave., 35th Ave. and 36th Ave.	10	18	2927.1
FUT-5-1	5	J33-004	J31-050	Between N. Hills St. and Old US Hwy 45	10	18	5027.0

This pipe segment should be upsized to 30 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.4 *Basin 20*

Pipe segment EX-20-1, located along 33rd Ave. between 17th St. and 21st St. is slightly surcharged under existing conditions. Simulation results indicate the surcharging will worsen under future flow conditions if no action is taken. This pipe segment should be upsized to 18 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.5 *Basin 12*

Pipe segment EX-12-1 is hydraulically deficient for both existing and future conditions flows. This pipe segment should be upsized to 24 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.6 *Basin 1*

Pipe segment EX-1-1 shown on Figure 4.17 is hydraulically deficient for both existing and future conditions flows. This pipe segment should be upsized to 30 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.7 *Basin 27*

Under existing conditions, majority of the sewer system modeled for the Basin 27 is hydraulically adequate. One pipe segment; EX-27-1 shows surcharging conditions under existing and future flow conditions. This hydraulically deficient pipe should be upsized to 24 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.8 *Basin 13*

Pipe segment EX-13-1, located along 45th Ave. between 14th St. and 5th St. is surcharged under existing conditions. Simulation results indicate the surcharging will worsen under future flow conditions if no action is taken. This pipe segment should be upsized to 36 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.9 *Basin 15*

Under existing conditions, majority of the sewer system modeled for the Basin 15 is hydraulically adequate. One pipe segment; EX-15-1 shows surcharging conditions under existing and future flow conditions. This hydraulically deficient pipe should be upsized to 18 inches to alleviate the existing and future conditions surcharging.

4.5.3.2.10 *Basin 5*

Under existing conditions, all of the sewer system modeled for the Basin 5 is hydraulically adequate. However, under future flow conditions, one pipe segment; FUT-5-1 shows surcharging

conditions. This hydraulically deficient pipe should be upsized to 18 inches to alleviate the future conditions surcharging.

4.5.3.3 Sewer Flushing Program

Low flow velocities, less than 2 fps, were prevalent throughout the modeled system. Low flow velocities cause debris to deposit in the sewers. Sludge, sand and other debris that have settled can effectively be removed through a sewer-flushing program. The flushing program requires high velocity of problem pipes up to 30 inches. All pipes in the existing system identified as having flow velocities less than 2 fps are shown on Figure 4.9. It is suggested that this figure be used as a guide for staff to target these problem areas.

4.5.3.4 RDII Reduction Plan

The capacity problems identified under the wet weather flow conditions stem primarily from excess RDII. RDII reduces the ability of sanitary sewer systems and treatment facilities to transport and treat domestic and industrial wastewater. There are various costs associated with RDII including sanitary sewer system overflow, wastewater treatment and transportation facilities, and funding opportunities. Additionally, sewer system backups into basements or households can result in litigation and potential liabilities for the responsible city or agency.

Capacity limitations caused by RDII can be managed either by reducing the RDII, conveying the excess flow through larger sewers and storage basins, or a combination of these two basic approaches. Eliminating inflow sources is normally the cheapest and quickest control measure. Infiltration control can be costly and is generally accomplished by repairing or replacing sewer mains and/or laterals. Expansion of sewage conveyance and storage capacity can also be expensive and is normally accomplished by eliminating bottlenecks with relief sewers or larger pump stations, or by constructing off-line storage for excess flow.

A RDII reduction plan consisting of a series of simulation runs was developed to determine tradeoffs between RDII reductions as compared to construction of increased sewer capacity. The analysis uses the calibrated hydraulic model to characterize the current RDII response at basin-scale. Conceptual reductions in RDII were then analyzed to predict the effectiveness of the reduction efforts. It was not the goal of this analysis to determine if it is cost-effective to pursue RDII reduction.

In conjunction with wet weather hydrographs, flow projections were used to produce various scenarios to evaluate three RDII reduction targets. The RDII reduction target levels ranged from 10 to 20 percent. The results show that if RDII reduction is found to be cost-effective, RDII reduction of between 15 and 20 percent will reduce observed surcharging by about sixty percent. The detailed results of all the five simulation runs are presented in Appendix D. It is suggested that independent study of the cost-effectiveness of RDII reduction be performed.

Chapter 5

PUMP STATION EVALUATION

Carollo Engineers evaluated the City's existing sewer pump stations. The City currently maintains and operates 61 sewer pump stations including 3 pump stations serving the Naval Air Station. Activities performed during the pump station evaluation include:

1. Development of a pump station asset database.
2. Updates to the City's GIS database including new force main locations, pump station locations, and pump station service areas.
3. Determination of pump station flow dependency.
4. Hydraulic modeling of flows to each pump station.
5. Assessment of pump station operational capacity.

5.1 PUMP STATION ASSET DATABASE

A pump station asset database was developed as part of the City's Wastewater Master Plan. The City's preliminary list of pump stations was modified according to existing City records and interviews with City staff. This process involved the removal of some pump stations from the City's pump station list and addition of others. The current pump station inventory includes information that was readily available from City records and information gathered from staff testimony. Pump station inspections were not part of the scope of this project, so the pump station database is not comprehensive. The database will benefit from information gathered during future pump station inspections by City staff or future studies. In all, the City is responsible for 61 pump stations including 3 pump stations serving the Naval Air Station. A summary of the updated pump station inventory is shown in Table 5.1 with the full inventory located in Appendix C.

Table 5.1 Summary of Pump Station Inventory
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

PS No.	PS Name	Location Description	City's File Ref	GIS Ref ID
1	8th Ave. North	8th Ave.	M41	LS-BT
2	8th Place	Windmill Sub Division	M15	LS-CG
3	9th Ave.	5th St. & 9th Ave. (Near Front St. and 10th Ave)	M25	LS-BS
4	10th Ave. North	Windmill Sub Division	M49	LS-CH
5	11 Ave	11 Ave. & Windmill Dr.	M04	LS-CJ
6	22 Ave. Heights	Causeyville Rd.	M21	LS-BY

Table 5.1 Summary of Pump Station Inventory
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

PS No.	PS Name	Location Description	City's File Ref	GIS Ref ID
7	27th Place	27th Street	M02	LS-BW
8	31 Ave. South	31 Ave. South	M19	LS-BZ
9	38th St.	38th St. & 24th Ave.	M48	LS-BJ
10	56th Court	56th Court and Dogwood Hills	M39	LS-BV
11	61st Court	61 Court	M37	LS-BU
12	65th Ave.	65th Ave.	M43	LS-AT
13	70th Place	Old 8th St.Rd.	M44	LS-AH
14	A Ave.	2213 A Ave.	M27	LS-BX
15	Air Port Lift Station	Highway 11 South	M12	LS-AA
16	Chandler Rd. #1	Chandler Rd. & Bounds Rd.	M11	LS-AR
17	Chandler Road #2	North End of Chandler Rd		LS-AS
18	Cotton Gin Rd.	Cotton Gin Rd. & Red Baron Rd. (flows to East WWTP)	M47	n/a
19	Days Inn	Highway 80 East	M24	LS-AQ
20	Dogwood Dr.	Dogwood Dr.	M33	LS-BR
21	Highway 39 #1	Highway 39 North		LS-BP
22	Highway 39 #2	Highway 39 North	M35	LS-BO
23	Hwy 19 S #1	890 Hwy 19 S, (near Mitchum Rd. & Hwy 19 S)		LS-AO
24	Hwy 19 S #2	992 Hwy 19 S, (near Bonita Dr & Hwy 19 S)		LS-BH
25	Hwy 493	6210 Hwy 493, near a new Church, 0.6miles north of 56th Ct & Hwy 493		LS-BI
26	James River	Virginia Dr.	M31	LS-BM
27	Knight Parker Rd.	Knight parker rd & Old US HWYS 11 & 80	M54	LS-CB
28	La La	900 Frontage Rd.	M18	LS-BL
29	Lindley Rd.	Lindley Rd.	M08	LS-BK
30	Lockhart Trailer Park Rd.	Lockhart Trailer Park Rd. (Flows to Cottin Gin Rd LS)	E9	n/a

Table 5.1 Summary of Pump Station Inventory
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

PS No.	PS Name	Location Description	City's File Ref	GIS Ref ID
31	Lovers Ln.	Old 80th St. Rd. & Lovers Ln.	M52	LS-AG
32	Lower Bounds Rd.	Chandler Rd.	M42	LS-AL
33	MCC	1435 College Drive	M01	LS-AK
34	N.A.S. Air Station	N.A.S. GATES (flows to Lockhart Trailer Park Rd. LS)	E8	n/a
35	Newell Rd. #1	Newell Rd.	M40	LS-BG
36	Newell Rd. #2	Newell Rd.	M06	LS-AI
37	Newell Rd. #3	Newell Rd.	M05	LS-BF
38	North East Softball	Newell Rd.	M07	LS-CE
39	North Hills St.	6520 North Hills St.	M34	LS-AE
40	North West School	35 Street	M03	LS-BE
40	North Wood Common	North Wood Common Cir.	M10	LS-BD
42	North Wood East	10 Ave.	M09	LS-BC
43	North Wood East Apt.	Highway 39 North	M38	LS-BB
44	Old 80 #1 Station	6900 Old 80 West	M17	LS-AF
45	Old 80 #2 Station	West of town near Railroad Tracks, near I-20 and Old US Hwy 80	n/a	LS-AW
46	Old 80 #3 Station	West of town by Prison Gates, near I-20 and Old US Hwy 80	n/a	LS-AV
47	Old 80 East Industrial Park	On US Hwys 11 & 80 between Us Hwy 45 and W Malone Ranch Rd, Inside Industrial Park	n/a	LS-CC
48	Pancake Field	19th St.	M20	LS-BA
49	Pippins Rd.	Bonita Dr.& Pippin Rd	E7	LS-CD
50	Red Lobster	Bonita Dr., South Frontage Road	M22	LS-AN
51	River Birch LS	Highway 19 North & 67 Ave. Loop (behind Colonial Storage on River Birch Drive)	M53	LS-CM
52	South Industrial Park	Highway 11 South	M46	LS-AP

Table 5.1 Summary of Pump Station Inventory Wastewater Collection System Rehabilitation Program City of Meridian, MS				
PS No.	**PS Name**	**Location Description**	**City's File Ref**	**GIS Ref ID**
53	Sowashee Creek	on Old US Hwy 11 & 80 near WMOX radio Station	M56	LS-CA
54	St. John	at the end of 27th Ave., between St John St. and Sowashee Creek?	n/a	LS-AZ
55	Sweet Gum Bottom Rd.	n/a	n/a	LS-CN
56	The Commons	North of Windmill Dr. at Old Poplar Springs Dr and 69th CT.	M55	LS-CI
57	Tom Bailey Dr.	Highway 11 & 80	M26	LS-AB
58	Tom Regan Rd.	65th Ave.	M45	LS-AD
59	Tommy Webb Dr.	Tommy Webb Dr.	M13	LS-CK
60	Village Fair Mall	North Frontage Rd.	M28	LS-CL
61	Windmill Dr.	Windmill Dr.	M16	LS-CF

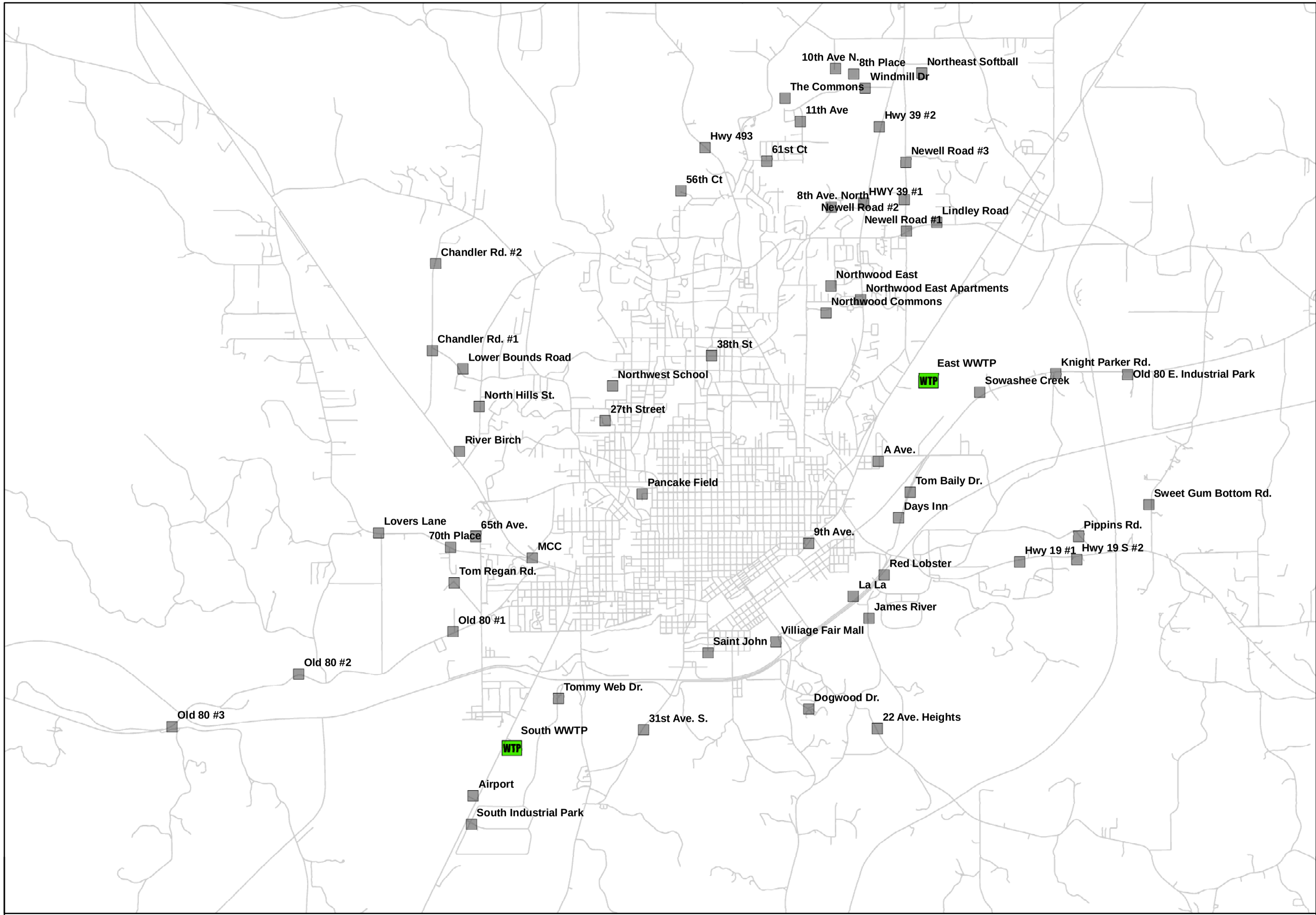
5.2 GIS DATABASE OF PUMP STATION AND FORCE MAIN LOCATIONS

Each pump station location was entered into the City's GIS database except for the three pump stations serving the Naval Air Station. Several force mains were also added to the GIS database and some sewer mains re-routed according to City staff interviews. The location of each pump station is shown in Figure 5.1.

Pump station service area polygons were added to the City's GIS database. The pump station service area polygons were used to estimate Inflow and Infiltration (I/I) rates to each pump station and calculate the linear footage of sewer mains located in each basin. Details of the I/I estimation are covered in Section 5.4. Each of the pump station service areas are shown in Figure 5.2.

5.3 PUMP STATION FLOW DEPENDENCY

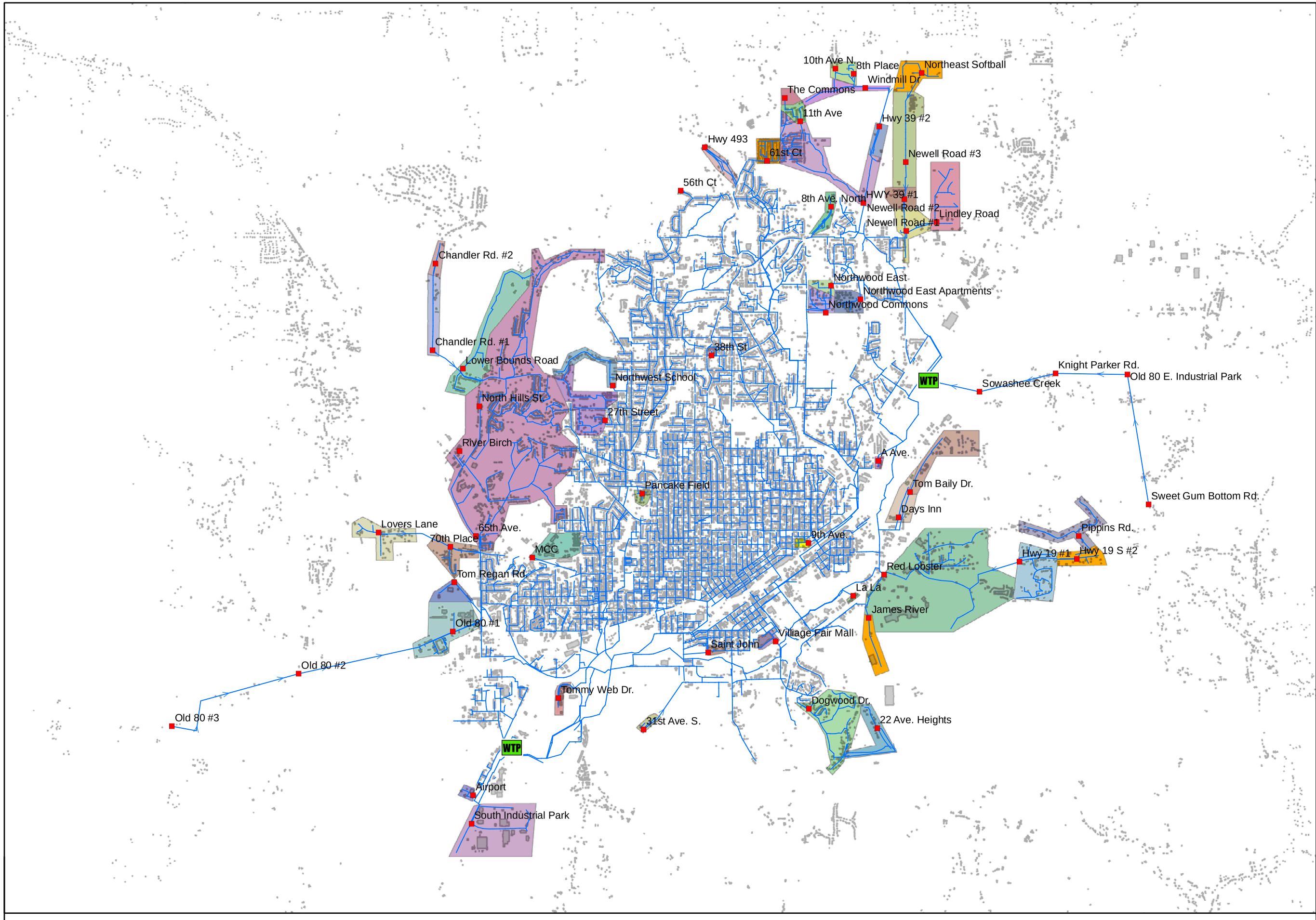
Since some pump stations are in series with other pump stations, the dependencies of upstream pump stations were examined for operational issues based on combined pumping flow rates. This required knowledge of the location of each force main. Many force main locations were already known, but City staff testimony provided the location of the remaining force mains. These additional force mains were added to the City's GIS. This allowed the pump station dependencies to be established. The pump stations that have two or more upstream pump stations in series are shown in Figure 5.3 along with their respective rated pumping capacity.



City of Meridian, MS
Wastewater Master Plan

Figure 5.1

PUMP STATION LOCATION



CITY OF MERIDIAN

Legend

- WTP — Wastewater Treatment Plant
- Pump Station
- Pipe
- Building
- Pump Station Service Area

N

0 4,000 Feet

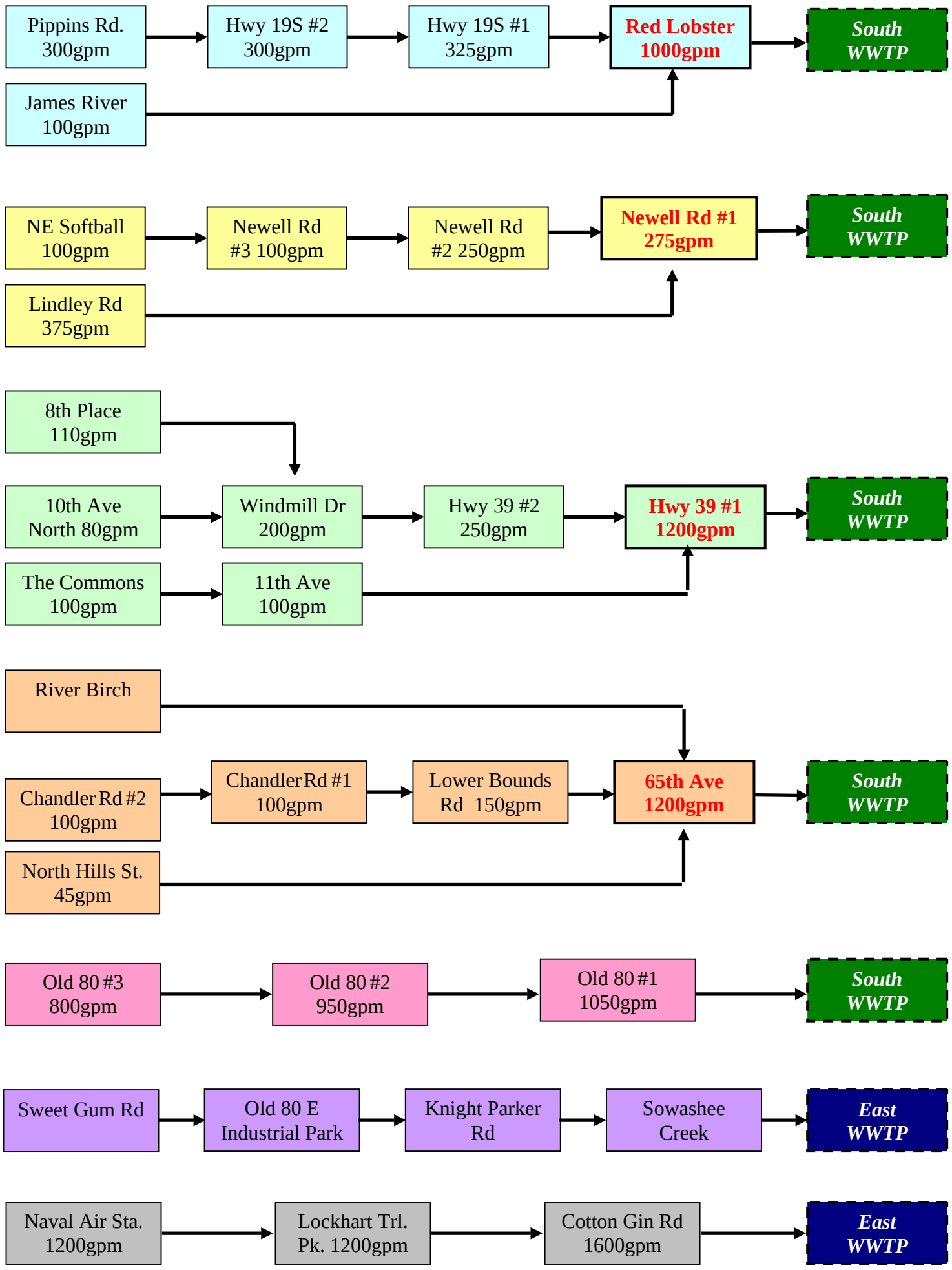
City of Meridian, MS
Wastewater Master Plan

Figure 5.2

PUMP STATION LOCATION

carollo

Figure 5.3 Lift Station Dependency Diagram



Each pump station service area was analyzed in terms of the approximate number of service connections and cumulative number of sewer mains upstream of each pump station. This analysis was limited by the currently available GIS data. Thirteen pump stations do not have footage totals for the cumulative upstream sewer mains because there are no pipes connected to the pump stations in the GIS. Eight of these pump station do not have a total of upstream connections. These thirteen pump stations will be excluded from the analysis due to insufficient data. The approximate number of upstream connections and approximate cumulative linear footage of sewer mains in each pump station service area is given in Table 5.2.

Table 5.2 Cumulative Number of Upstream Connections and Linear Footage of Sewer Main in each Pump Station Service Area
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station Service Area	Cumulative Upstream Sewer Mains (linear feet)	Cumulative No. of Up Stream Connections
65th Ave.	125,000	869
Red Lobster	81,500	293
Hwy 39 #1	40,000	345
Hwy 19 S #1	28,600	114
Newell Rd #1	28,000	120
Dogwood Dr.	26,600	106
Hwy 39 #2	14,500	120
70th Place	14,000	55
Hwy 19 S #2	13,000	57
Newell Rd #2	12,200	77
27th Street	11,800	125
Lower Bounds Rd	11,800	50
Newell Rd #3	9,800	63
Lindley Rd.	9,200	43
South Industrial Park	8,800	18
Old 80 #1 Station	8,500	53
Pippens Rd.	8,100	41
Windmill Dr.	7,800	118
North Wood Common	7,800	28

Table 5.2 Cumulative Number of Upstream Connections and Linear Footage of Sewer Main in each Pump Station Service Area
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station Service Area	Cumulative Upstream Sewer Mains (linear feet)	Cumulative No. of Up Stream Connections
Chandler Rd #2	6,600	3
61st Court	6,100	104
North East Softball	6,000	4
North West School	5,200	48
22 Ave. Heights	5,200	24
Hwy 493	4,300	22
Lovers Ln.	3,900	37
8th Place	3,800	40
Tom Regan Rd.	3,700	4
11th Ave.	3,500	79
Tom Bailey Dr.	3,500	20
8th Ave. North	3,300	7
James River	2,700	8
Village Fair Mall	2,500	30
Days Inn	2,400	15
North Wood East Apt.	2,100	30
10th Ave. North	2,000	18
North Wood East	1,800	6
Tommy Webb Dr.	1,650	60
Pancake Field	1,500	22
St. John	1,500	10
Air Port Lift Station	1,500	6
31 Ave. South	1,500	4
9th Ave.	1,250	25
Chandler Rd #1	1,100	13

Table 5.2 Cumulative Number of Upstream Connections and Linear Footage of Sewer Main in each Pump Station Service Area
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station Service Area	Cumulative Upstream Sewer Mains (linear feet)	Cumulative No. of Up Stream Connections
A Ave.	1,000	16
38th St.	400	59
North Hills St.	50	1
MCC	0	15
La La	0	4
56th Court	0	2
The Commons	n/a	50
Old 80 #2 Station	n/a	20
Old 80 #3 Station	n/a	5
Cotton Gin Rd.	n/a	n/a
Knight Parker Rd.	n/a	n/a
Lockhart Trailer Park Rd.	n/a	n/a
N.A.S. Air Station	n/a	n/a
Old 80 East Industrial Park	n/a	n/a
River Birch LS	n/a	n/a
Sowashee Creek	n/a	n/a
Sweet Gum Bottom Rd.	n/a	n/a

5.4 HYDRAULIC MODELING OF FLOWS TO PUMP STATIONS

According to the Mississippi Department of Environmental Quality's (MDEQ) design guidelines for wastewater facilities, a pump station must be designed to handle "maximum anticipated sewage flows" with any one pump out of service. The wastewater flows to each pump station were approximated by assessing the DWF and expected RDII flowing to each pump station. Appropriate DWF peaking factors were also applied to calculate design flow rates from average flow rates. Since long-term DWF data was not available, the Great Lakes Upper Mississippi River Board standard (GLUMRB) DWF peaking factor was applied. Total design flow to each pump station was calculated as:

$$Q_{peak} = Q_{avg\ DWF} \times PF + Q_{RDII} \qquad \text{(Eq. 3.1)}$$

where Q_{peak} = peak hourly wet weather flow rate (gpm)

$Q_{avg\ DWF}$ = average daily flow rate (gpm)

PF = DWF peaking factor

Q_{RDII} = additional wet weather flow expected from 5 year - 24 hour design storm (gpm)

$Q_{avg\ DWF}$ from each service connection were approximated according to *Wastewater Collection System Modeling and Design* by Haested Methods, 2004 and given by the following:

- 200 gallons per residential house per day
- 105 gallons per apartment unit per day
- 40 gallons per restaurant seat per day
- 125 gallons per hotel room per day
- 2.5 gallons per church seat per day
- 475 gallons per store frontage per day, for the first 25ft of store frontage
- 400 gallons per store frontage per day, for each additional 25ft of frontage
- 15 gallons per office personnel per day
- 185 gallons per hospital patient per day

Using the above flow assumptions, DWF to each pump station was estimated. A DWF peaking factor (PF) was applied to approximate the peak hourly DWF rates to each pump station. The peaking factor used in these calculations is the GLUMRB peaking factor from *Wastewater Collection System Modeling and Design* by Haested Methods, 2004 and is given by:

$$PF = 2.4(Q_{avg})^{-0.11} \quad \text{(Eq. 3.2)}$$

Where Q_{avg} is the average flow rate (ft^3/sec) to the pump station

The pump station service areas, mentioned in Section 5.2, were used to estimate RDII to each pump station.

5.5 ASSESSMENT OF PUMP STATION OPERATIONAL CAPACITY

Each pump station was evaluated according to its ability to handle the design flows of incoming wastewater based on the flow assumptions developed in Section 5.4. DWF were estimated by accounting for the number and type of service connections using the City's GIS. Appropriate DWF Peaking Factors were applied and RDII was estimated using the 5-year, 24-hour design storm as described in Section 4. When design flows are compared with the rated capacity of the largest pump at each pump stations, some pump stations are under capacity. The analysis included the assessment of the largest pump at each station due to the limited availability of information. The pump station capacity assessment summary is shown in Table 5.3 with under capacity pump stations shown in red with parenthesis.

5.6 ANALYSIS OF FOUR CRITICAL PUMP STATIONS

During the course of the pump station analysis it became clear that four pump stations, in particular, garnered further attention. Based on the results of the flow modeling, interviews with City staff, and future growth projections, four pump stations: 1) The Red Lobster Pump Station, 2) The 65th Ave. Pump Station, 3) The Hwy. 39 #1 Pump Station, and 4) The Newell Road #1 Pump Station deserved closer analysis.

Pump Station operational information and anecdotal comments were supplied by the operators. The collection system network information was based on the GIS database updated by Carollo. Land use is based on maps obtained from Meridian's 2003 Comprehensive Plan published by the community development department. Past, current and future growth information was supplied by Meridian's Community Development Department in 2007.

5.6.1 The Red Lobster Pump Station

Insufficient Wet Well Volume for Dry Weather Flows and Insufficient Capacity for Wet Weather Flows: The Red Lobster Pump Station (PS) has a 1000gpm, 24HP pump and is experiencing rapid cycling times between 6-8 minutes during normal dry weather operation (WEF recommends cycling times no shorter than 10 minutes for pumps smaller than 25HP). The wet well has an 8 feet diameter and is 4 feet deep. Since the new sewer main coming into the well from the new mall is at the 3 feet mark, the wet well can only fill to about 3 feet deep before the wastewater begins to back up into main line. The operator currently allows wastewater to backup into the mainline to help minimize pump cycle times, but this puts the sewer main at risk for blockages due to sediment buildup as a result of low flow velocities.

Past Growth: The Red Lobster PS serves a rapidly growing area. Over the past 5-10 years the Red Lobster PS has seen its incoming flows increase due to a new mall development, hotels, and several other retail shops nearby. Moderate residential growth has occurred to the east of the Red Lobster PS along Hwy 19 including new apartment complexes on Willow Ridge Dr. and some single family homes. Four other pump stations pump to the Red Lobster PS service area (Pippins Rd, Hwy 19 S #2, Hwy 19 S #1, and James River).

Current and Future Growth: Areas to the immediate north and immediate south of the Red Lobster PS have been flagged as "Growth Areas" by Meridian's community development department in 2007. Both of these areas are zoned commercial. The $60M Meridian Crossroads development is currently underway and will soon come online. Another big box retailer is also expected to build a store nearby within then next few years. The area east of the Red Lobster pump station along Hwy 19 is posed for future commercial growth. The intersection of Hwy 45 and Hwy 19 has been flagged as a "Future Business Area" in 2007. Also, a $70M Arts Center may be built near the Bonita Lake.

Public Relations: The Red Lobster PS is located in the parking lot of the Red Lobster restaurant and is within 50 feet of the I-20 South Frontage Road. Overflows would be highly publicized and potentially hazardous to restaurant patrons and nearby businesses.

Odor: The Red Lobster PS has been the subject of many odor complaints since it is located in the parking lot of the Red Lobster restaurant. The restaurant would conceivably be very pleased to see the pump station relocated or eliminated.

Future Plans: The Red Lobster PS was originally put in service because of a boring project, which was installed at negative slope under the interstate highway. The line was supposed to be a gravity sewer from the Red Lobster parking lot to the other side of the interstate, but it was built with negative slope thereby necessitating a pump station. Meridian is considering eliminating this pump station by boring a new pipe beneath the interstate (approx. 287ft). This would serve to enhance operational efficiencies, lower complaints, and provide room for future growth.

5.6.2 65th Ave. Pump Station

Largest Service Area: The 65th Ave. PS has approximately 819 wastewater service connections including 727 single family homes, 64 businesses (including churches), and 28 apartment complexes. The 65th Ave. PS receives flow from more service connections than any other PS in Meridian. The service area includes approximately 125,000 feet of sewer pipe, not including service laterals. Four other pump stations pump to the 65th Ave. PS service area (Chandler Rd. #2, Chandler Rd. #1, Lower Bounds Rd. and 56th Place).

Insufficient Capacity: The 65th Ave. PS is prone to overflows during wet weather periods. An outfall to a nearby creek was constructed many years ago to relieve peak wet weather flows. The PS has a 1200gpm, 25HP pump and is experiencing cycling times of approximately 20 minutes during normal dry weather operation and runs continuously during peak wet weather flows. The PS used to be a dry/wet well configuration, but the operators knocked a hole between the two chambers to provide more storage capacity. The wet well is only 3 feet deep and has a rectangular shape.

Past Growth: Most of the growth in the past 15 years has been commercial growth along Hwy 19 N between 65th Ave S and Chandler Rd. There has also been low to moderate residential growth along North Hills St.

Current and Future Growth: There is potential for further commercial growth along Hwy 19 N and residential growth along North Hills St and State Blvd. However, since much of this area is in the 100 year flood plain, the growth may be slow.

I/I Potential: Since much of the service area is in areas with high water table, the 65th Ave. PS is prone to receiving significant GWI and RDII.

5.6.3 Hwy 39 #1 Pump Station

Insufficient Wet Well Volume for Dry Weather Flows and Insufficient Capacity for Wet Weather Flows: The Hwy 39 #1 PS has a 1200gpm, 36HP pump and is experiencing rapid cycling times

between 3-4 minutes during normal dry weather operation (WEF recommends cycling times no shorter than 10 minutes for pumps smaller than 25HP, and longer cycle times for larger pumps).

Past Growth: During the past 15 years the Hwy 39 #1 PS service area has seen significant residential growth. Growth areas include subdivisions near the intersection of 61st Ct. and11th Ave and neighborhoods along Windmill Dr. and Old Country Club Place. Five other pump stations pump to the Hwy 39 #1 PS service area (10th Ave. N, Windmill Dr., Hwy 39 #2, The Commons, and 11th Ave.).

Future Growth: Windmill Dr has been designated as a "Growth Area" with many residential and commercial developments expected. A new road is planned to run from Windmill Dr., near Old Country Club Pl. to Hwy 39. Several medium and high density residential areas are expected to develop along this new road. Additional commercial growth is also expected along Hwy 39 south of Windmill Dr as well as a new 1000 person School across from Northeast Lauderdale Elementary School.

Ground Water Infiltration: One of the main lines coming into the Hwy 39 #1 PS runs along a creek in a heavily wooded area. The operators have mentioned significant amounts of ground water entering the wet well and suspect the nearby creek is responsible.

Public Relations: The operator has noted that the property owner is very unhappy with the pump station located on his property.

5.6.4 Newell Rd #1 Pump Station

Past Growth: During the past 15 years most of the flow increase to the Newell Rd. #1 PS was due to residential growth north of Lindley Rd., and subdivisions along Newell Rd. Four other pump stations pump to the Newell Rd #1 PS service area (North East Softball, Newell Rd. #3, Newell Rd. #2 and Lindley Rd).

Future Growth: Areas along Newell Rd between Windmill Dr and North Hills St. have been designated as "Growth Areas". The expected growth is mixed between high density residential and commercial, including a new 1000 person School across from Northeast Lauderdale Elementary School.

Insufficient Capacity for Dry Weather Flows: The Newell Rd. #1 PS has a 275 gpm, 15HP pump and is experiencing moderate cycling times of approximately 15 minutes during normal dry weather operation. The wet well is has a 5' diameter and 55" depth.

Future Plans: The City is considering moving the Newell Rd. #1 PS since North Hills St is slated to be expanded to 4 lanes.

5.7 RECOMMENDATIONS

The recommendations for pump station improvements are based on the limited information available for the pump stations. A more detailed investigation should be performed prior to

implantation of the recommended improvements. This should include a complete capacity analysis of the pump stations including, performing a pump draw down test to determine the true pump capacities. Structural condition was not considered for this analysis. Capacity improvements for the pump stations were divided into two categories based on the severity of the deficiency.

5.7.1 Priority 1 and 2 Pump Station Capacity Improvements

Priority 1 pump station recommendations include improvements to the four critical pump station identified in Section 5.6. These pump station represent the highest risk for capacity failure. The station firm capacity should be capable of meeting 3 times the average dry weather flow. The recommended capacity for the priority 1 improvements is shown in Table 5.4.

Table 5.4 Priority 1 Lift Station Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station	Existing Pump Capacity (gpm)	Total Cumulative Incoming Flows to Pump Station (gpm)	Design Flow with 20% growth (gpm)
Red Lobster	1,000	1,277	1,500
Newell Rd #1	275	775	900
Hwy 39 #1	275	688	800
65th Ave.	1,200	1,979	2,400

Priority 2 pump station recommendation included improvements to the ten under capacity stations identified in Table 5.2. These pump stations were not identified as high risk for capacity failure, but may become higher priorities in the near future. The recommended firm capacity for the priority 2 improvements is shown in Table 5.5.

Table 5.5 Priority 2 Lift Station Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station	Existing Pump Capacity (gpm)	Total Cumulative Incoming Flows to Pump Station (gpm)	Design Flow with 20% growth (gpm)
Newell Rd #2	250	458	500
Newell Rd #3	100	392	500
Lower Bounds Rd	150	154	200
61st Court	75	89	100
Days Inn	150	152	200

Table 5.5 Priority 2 Lift Station Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station	Existing Pump Capacity (gpm)	Total Cumulative Incoming Flows to Pump Station (gpm)	Design Flow with 20% growth (gpm)
MCC	100	203	200
North Hills St.	45	117	100
North Wood East Apt.	150	371	400
Pancake Field	100	108	100
Village Fair Mall	100	148	200

5.7.2 Update Pump Station Asset Database and GIS

The pump station asset database should be updated and completed. The current assessment was performed using the readily available information. Competition of the database would provide information necessary to perform a more detailed analysis. Missing data should be field acquired. The GIS should be updated and expanded to include the pipes connected to the far out list stations. This would provide the minimum information to perform a capacity analysis on the stations excluded from the analysis due to lack of information.

OPERATIONS REVIEW

The City of Meridian has undertaken a review and evaluation of the existing wastewater collection system operations in association with the Sewer System Evaluation Survey (SSES). The goal was to review current practices and recommend changes that will improve customer service, and to minimize operations and maintenance (O&M) associated with the wastewater collection system.

The City of Meridian is located in the extreme east central of Mississippi. The Meridian collection system consists of approximately 303 miles of gravity sewer with a total replacement value of $240 million. The system consists of a high percentage of small diameter vitrified clay pipe, which will require an increased maintenance demand as it continues to age. Portions of the Meridian system are reaching their design life of 75-100 years. In order to minimize system renewal costs and to extend the life of the system, rehabilitation or renewal of the existing infrastructure will be required.

The utility has several existing support programs that will require little effort to integrate into the overall framework of the O&M program. The following existing programs/activities have been identified as needed on an on-going basis:

- Geographic Information System provides an inventory of installed piping, pipe size, and pipe material. Supported by the Engineering Department, the GIS will provide updated maps of the collection system.
- The current work order system is more labor intensive than paperless systems being implemented nationwide. Implementation of an updated work order system can improve response times, allow electronic records referenced to a GIS system, and optimize crew resource scheduling.
- Hydraulic modeling of the wastewater collection system is currently on going. Once completed, this model will assist the City in determining a prioritized plan to ensure future capacity of the wastewater collection system.
- Maintaining Record Drawings and Specifications of new construction are critical to maintaining the collection system. Updating the GIS sewer maps with the new construction and providing field crews with up to date maps should allow the City to provide reliable service for the collection system.
- Cleaning and utilizing Closed-Circuit Television inspections for blockage removal will be a continuing requirement for the City as the clay pipes of the collection system ages. A procedure should be established to internally inspect (via CCTV) sewers with chronic stoppages in order to identify the cause and consider a course of action for repairs.
- Budgeting and accounting procedures for tracking of capital and O&M expenditures are organized well by City personnel. The City appears to be marginally funded with the current budgeting procedures and scheduled user rates.

- Sanitary Sewer Overflows are source of many regulatory issues for the City. The City staff is currently working to reduce overflows and maintain regulatory compliance through the use of hydraulic modeling, evaluating capacity needs and identifying sources of excessive infiltration/inflow.

Overall, the City of Meridian has implemented many of the programs that are necessary to provide for reliable service, sustained operation and maintenance of the wastewater collection system. Table 1 of Attachment B illustrates a summary of the evaluation findings. A summary of recommendations is as follows:

- Preventive maintenance cleaning is currently not being undertaken by the City due to insufficient equipment and lack of trained field crewmembers. One additional cleaning truck with an easement access kit should be budgeted.
- Vacant employment positions within the department should be filled in order to implement repairs and establish preventive maintenance procedures.
- The Sewer Use Ordinance should be reviewed by the Public Works staff and updated as needed to address excessive infiltration/inflow, illicit connections and grease blockages. Grease is a major cause for system blockages and overflows. An extensive training and inspection program is recommended to ensure grease traps are being maintained, cleaned, and inspected periodically. Code enforcement and staff should review design criteria for grease traps and consider revising the SUO to require grease trap installations at apartments and other multifamily residential units.
- As-built record sewer construction drawings are not available to be updated into the collection system maps within a timely manner. Maintenance crews should have the best available information on asset locations in the event of a service call.
- Utilizing GIS software to identify the collection system's sewer lines and manholes is only about 65% complete. It is recommended that 11"x17" updated grid maps will provide easy to use accurate maps for use by line maintenance crews.
- Hydraulic modeling of future additions to the collection system will address the impact on downstream pipes for current and future capacity needs for sewers 10-inch and larger. New developments should be reviewed to ensure that adequate downstream capacity exists and to determine the impact on the existing collection system.
- The existing safety program is very good. It is recommended that the City conduct an annual safety drill to review response times and coordination with the appropriate agencies and to prepare an updated safety manual for each employee.
- The City currently has several Satellite City Agreements that Public Works staff and City Attorney should review to determine if the agreements address concerns such as grease and high infiltration/inflow.

- Long-term funding to rehabilitate and extend the life of the aging sewer infrastructure will be required. The City should consider providing Program projects to repair sources of infiltration/inflow and for unpredicted failures requiring emergency repair.
- The City should develop a long-term Program projects to provide administrators with current and future needs and estimated costs.

The cost to implement these recommendations is summarized in Table 2 of Attachment B along with a proposed implementation schedule. Although a majority of the recommendations can be undertaken by city staff at minimal cost, some will require going thru the budgeting process.

6.1 COLLECTION SYSTEM

6.1.1 Organization

Figure 4 of Attachment B presents the current City organizational chart. With recent trends in regulatory reporting, an updated departmental organization chart will need to be developed to identify City staff responsible for implementing, managing and updating the SSO abatement programs. This includes staff members responsible for managing the SSO response, investigating the cause, and reporting the SSO to the appropriate regulatory agencies. Figure 5 of Attachment B presents a recommended organization chart for the Collection System Maintenance Department under the Public Works Director with the following titles and position descriptions:

- Chief Administrative Officer and Director- Establishes departmental policy, plans strategy, leads staff, allocates resources, manages capital improvement delivery system, prepares itemized budgets, and coordinates development and implementation of various water and sewer programs.
- Operations Superintendent- Manages field operations and maintenance activities, provides relevant information to management, prepares and implements contingency plans, oversight for inflow and sewer repair crews, and maintains sewer pump stations and telemetry systems.
- Field Supervisors- Oversee scheduling of maintenance crews, inflow reduction crews, and repair crews.
- Field Crew- Perform maintenance activities, mobilize and respond to notification of stoppages and SSO's, inspect and test manholes and mainline, and perform sewer repairs.

6.1.2 Regulatory Compliance

Reduction in sanitary sewer overflows is a priority for the City to maintain long-term compliance with the MDEQ and EPA. Due to the age of the existing infrastructure, soil conditions and rainfall potential; additional crews and equipment will be required to maintain the existing level of customer service and reliability. As a result, the cost of service can be expected to increase as existing sewers are rehabilitated and/or replaced and new sewers are added to the collections system. Increasing the funding for collections system repair and rehabilitation will be required in order to

continue to provide reliable service. The Meridian system replacement value is $240 million with a design life of 100 years. This would equate to approximately $2.4 million per year to fully fund replacement of the system. Based on average costs nationally, replacement costs are approximately $150/lf while rehabilitation costs are $15/lf. The estimated rehabilitation cost for Meridian would approach approximately $24 million (excluding any system capacity upgrades).

6.1.3 Satellite Communities

The City provides wastewater treatment for the City of Marion (population 1,389), a prison facility (including an adjacent truck stop), and the Naval Air Station (population 4,000). Permanent flow meters for each of these communities are installed to meter the flow into the collection system. The agreements and rates for the satellite communities are established by City ordinance (Attachment B).

6.2 MAINTENANCE

The City of Meridian has recently initiated a Sanitary Sewer Evaluation for the collection system. This evaluation will include developing a detailed plan to address SSO's and infiltration/inflow into the collection system. The following are the parameters used to evaluate the condition of the collection system:

6.2.1 Priority Areas

The City has recently completed a flow monitoring study to identify basin areas that have excessive infiltration/inflow in order to prioritize areas of the collection system requiring additional field efforts. Results of the flow monitoring study are presented in the July 2006 "Wastewater Flow Monitoring Final Report."

6.2.2 Manhole Inspections

Inspections of the manholes are currently being outsourced and conducted in the priority basins identified previously. Defects are identified and repairs are prioritized and scheduled accordingly.

6.2.3 Smoke Testing

The City utilizes high capacity smoke blowers to locate sources of odor and infiltration/inflow into the collection system. Both mainline and service laterals are tested to identify defects and repairs are prioritized and scheduled.

6.2.4 CCTV

The City owns and operates a single push camera that is utilized for the following:

- Inspection of problem line segments.
- Locate illicit connections.
- Inspect chronic blockages to locate cause and determine repair strategy.

- Assessment of the line condition.

It is recommended that the City budget a CCTV inspection van based upon the size and age of the collection system. The information collected from the CCTV inspection will assist in prioritizing the repair strategy and establishing the cause of blockages to reduce the number of work orders for repeat locations.

In addition to inspecting chronic stoppages, the CCTV equipment can inspect new construction service laterals and mainlines to ensure compliance with City standards and specifications. The goal would be to identify any defects in construction and repair under the warranty before expiration. It is recommended that City staff and any outside inspection service companies be certified under the Pipeline Assessment Certification Program (PACP). Using PACP certified operators would ensure that sewer pipeline defects are coded and described uniformly with the same terminology.

6.2.5 Cleaning

Cleaning of the sanitary sewers is a very important function completed by the City. Internal daily cleaning of the sewer line and pump stations assist in the following:

- Remove blockages.
- Remove root intrusion.
- Remove grease blockages.
- Remove settled and floating debris.
- Clean pipelines before CCTV inspections.
- Remove grit accumulation.
- Restore system capacity.
- Minimize SSO’s.

The City currently owns and operates two jetting trucks. Each jetting truck utilizes a high-pressure hose reel and nozzle to remove blockages and perform regular cleaning of lines. With over 300 miles of sanitary sewer lines, the City will require an additional jetting truck due to the high usage and extensive maintenance required of the remaining jetting trucks. In addition, an easement attachment kit is recommend in order to access remote areas for cleaning.

6.2.6 System Repairs

A high percentage of the Meridian collection system is complied of clay sewer pipe. Most of these lines are nearing the end of the design life of 75 years. There are various rehabilitation methods that are available to extend the design life of these assets. The City currently conducts sewer cleanings to remove blockages associated with customer complaints. Preventive maintenance cleanings are conducted on a limited basis to address repeated blockages.

Additional crews will be required to perform repairs to sewer mainlines as the existing clay sewer pipes continues to near its useful design life. Chronic problem areas should be considered for replacement utilizing pipe-bursting methods. At that time, installation of service cleanouts can be completed at the property line if applicable.

6.2.7 Performance Indicators

The following performance indicators are recommended to track the progress and condition status of the collection system:

- Number of customer sewer complaints.
- Number of sewer stoppages and their cause.
- Number of dry weather overflows and their cause.
- Number of wet weather overflows and their cause.
- Number of cave-ins.
- Number of pump station failures and their type.
- Average time to respond to events or complaints.
- Number of grease trap inspections and violations.
- Lost time injury rate of employees based on hours worked.

6.3 ENGINEERING

Engineering provides support within the Public Works Department for streets, storm water, parks, etc. The support functions for the wastewater group include:

- Maintaining standard design criteria and construction details for new installations of sewers, streets, drainage, and water distribution.
- Review new construction with input from wastewater utilities staff.
- Construction inspection.
- Update collection system maps.
- Maintain all assets in GIS system.

6.3.1 As-Built Plans

As-built plans are maintained by engineering and are used to validate the collection system maps. The GIS maps are updated with completed as-built plans as time permits basis. Electronic and hardcopy maps are available from engineering.

6.3.2 Sewer System Maps

Approximately 65% of the sewer collection system has been GPS surveyed and the maps updated by engineering. Line maintenance staff still rely on the 36” x 44” blue-line drawings as the most up to date maps of the collection system. Corrections or additions to these blue-line drawings are provided by line maintenance for updating as time permits basis.

The process of inputting and updating the GIS maps is a slow and as time permits process. It is recommended that the line maintenance maps be provided to the GIS technicians to update the GIS collection system maps. The GIS maps can then be provided in an 11”x17” grid map with manhole asset identification numbers. Figure 7 of Attachment B illustrates an example of the 11”x17” grid map developed for the City with asset numbers assigned to manholes. Advantages of this process include:

- Line maintenance can be dispatched to specific manholes instead of street intersections.
- More manageable for line maintenance staff to handle 11”x17” grid maps.
- Ability to track repairs to specific manholes instead of adjacent street intersections.

Public Works relies heavily on GIS mapping for dispatching crews, performing maintenance and tracking performance of maintenance activities. GIS technicians can display locations for chronic SSO’s, maintenance calls for blockages, lines with historical CCTV video, manhole inspection history and progress, smoke testing history, and rehabilitation history.

New development projects are required to submit as-built drawings upon completion. The GIS technicians will update the GIS maps. While large development projects may take up to a year to be updated in the GIS system, the line maintenance crews will not have maps identifying these new asset locations. A policy should be developed that will:

- Update GIS maps when development construction plans are approved to expedite as-built updates.
- Identify in the GIS system the lines that are under warrantee for service calls.
- Schedule a warrantee follow up inspection through the GIS system before the expiration of the warrantee period.

6.3.3 Gravity Sewer Design

Local consulting engineers use City standards and specifications for design of gravity sewer systems for new developments. The use of a hydraulic model of the collection system will provide the City with recommendations and prioritization of future Program projects. The City is currently using InfoWorks dynamic modeling software to model the collection system.

Based on the City’s Code of Ordinances (Attachment B) and subdivision ordinance, the minimum gravity sewer size for new construction is 8-inch diameter PVC pipe rating SDR 26. A warrantee period of 1-year and review by line maintenance personnel is required as part of the design review

process. At this time the is no written policy on warrantee review or approvals for new construction developments.

6.3.4 Construction Inspection

Public works provides construction inspection services depending on the type of project. Construction warranties are generally required by contract although no written program has been developed to track the final warrantee inspection and final acceptance. Inspection services may be completed by third party inspectors or required as part of the consulting design engineers contract. Appendix B of Attachment B includes the “Construction Guidelines” developed by the City for reference.

6.4 TECHNICAL SUPPORT FUNCTIONS

6.4.1 Information Management

The City utilizes a computerized work management system that tracks customer complaints, budgets, etc. The system is not integrated with GIS mapping, wireless intranet, or any automated vehicle location system with the work management system. The existing work management system operates as follows:

- Request for service phoned in to the Public Works office.
- The information is entered in to the computerized work management system.
- Crews are assigned based on departmental procedures and location of nearest available crew.
- Field crew receives the work order via radio.
- Once the work is completed, a paper back up copy of the work order is filed with the Public Works office.

This system requires additional labor efforts as compared to other more modern systems that the City should consider upgrading in the future.

6.4.2 Contingency Planning

- **Public Notification**- City has several media outlets to utilize to notify and/or inform the public by way of a web site, newsletter, cable access, newspaper, door hangers, and billing inserts.
- **Regulatory Notification**- The Line Maintenance Superintendent is responsible for regulatory notification issues associated with the collection system. A draft Emergency Response Plan and Policy (Appendix C of Attachment B) has been prepared to address SSO response and reporting. The draft policy is intended to instruct staff members on responsibilities and procedures.
- **Pump Stations**- The collection system operates 55 pump stations to transport wastewater for treatment. Of these pump stations, only sixteen (16) pump stations are equipped with

telephone telemetry to notify staff of any operational issues. Some of the pump stations are equipped with generator transfer switches that are used with a portable generator in the event of power loss. Key replacement components for the pumps and controls are kept as part of the maintenance inventory as well as spare pumps for the pump stations.

- **Collection System Parts Inventory**- The purchasing department maintains an inventory of supplies for pipe, fittings, valves, etc. for the collection system. As the inventory items are used, supplies are then reordered with a set minimum quantity. The purchasing department should be aware of delivery lag times for supplies to ensure that the items are available when needed.

6.4.3 Ordinance Review

- **Sewer Use Ordinance (SUO)**- The existing SUO for the City prohibits discharges of storm water, grease, fats, etc. into the collection system (see Appendix A of Attachment B). The SUO should be updated to address the issues of extraneous infiltration/inflow and fat, oils and grease (FOG). A sample SUO is presented in Appendix D of Attachment B for review. The updated SUO on private service lines is vital to fully develop an infiltration/inflow reduction program.
- **FOG Ordinance**- There is no current City ordinance that addresses FOG specifically. Sewer blockages as a result of FOG are the primary cause for sanitary sewer overflows with the collection system. Appendix E of Attachment B presents a draft FOG ordinance for staff review and consideration.
- Restaurants are the largest contributors of grease to the collection system. The State Health Department has the responsibility for inspecting restaurants for health code violations. These inspections do not focus on grease traps or the frequency of cleaning. Discussions with the Health Department have determined that if a grease trap is not visibly overflowing or causing backups, then no inspection is conducted. The addition of grease trap inspections would greatly reduce the number of blockages and resulting SSO's. It is recommended that the City and State Health Department develop and implement a change in the inspection items reviewed to address grease trap inspections.
- In addition to restaurants, apartments are another major source for FOGs. The City should review the impact of requiring installation of grease traps for apartments and other types of multi-family housing units.

6.5 ADMINISTRATIVE SUPPORT

6.5.1 Human Resources

The City of Meridian maintains written job descriptions for all positions within the Public Works Department. The Civil Service Selection System is used to fill vacant positions. This selection process results in long delays between posting an open position and filling the position. Currently only 32 of the 46 Public Works Department positions are filled.

6.5.2 Safety Program

The City does not have a written safety-training program for employee's responsibilities and hazard awareness while on the job. Employees are held personally responsible for their actions and safe conditions in their work areas. A safety committee meets regularly to address and review accidents that are reported for corrective actions. A priority for the safety committee would be to review and update the following safety programs:

- Safety Committee authority.
- Confined Space Entry Program and Permit.
- Written safety procedures.
- Site traffic control and management.
- Utility trenching program.
- Safety equipment calibration, maintenance, and storage.
- Performance measures and effectiveness of each program.
- Inventory of chemicals used by staff for the Material Safety Data Sheet (MSDS) inventory program.

Based on a review of the City's Safety Program, the following recommendations are presented for review:

- Conduct random safety inspections for adherence to safety programs and document findings.
- Perform annual safety drills for each program to review coordination and response times with local emergency services.
- Establish calibration and maintenance program for safety equipment and gas detectors.
- Prepare a written safety policy manual. Appendix G of Attachment B presents a Draft Safety Manual for review.
- Provide proper training and handling of all chemicals inventoried as part of the MSDS program.

6.5.3 Financial

The City of Meridian staff prepares and tracks the budgets. The current user rates (Appendix A of Attachment B) are sufficient to fund budgeted wastewater needs. The budgets do not appear to have sufficient funding for the following:

- Collection system rehabilitation to reduce infiltration/inflow.
- Fully fund Program projects for future growth.
- Add emergency repairs budget provision.

Consistent annual funding for collection system renewal should be a high priority for the City in order to utilize the least cost repair methods. The unexpected collapse of a pipeline can only be repaired as an emergency replacement, which is at the highest cost. A prioritized Program plan that anticipates future needs and costs is recommended for intervals of 5, 10 and 20 years.

Due to the age of the collection system, failures of pipelines and pumps stations can be expected with repairs handled as an emergency. Funding should be budgeted accordingly to provide for such contingencies.

The City Council reviews and adjusts the user rates as necessary. The Public Works Department must work closely with the Council to ensure that adequate funding exists for the aging collection system. The water and sewer systems of the City will require increased funding in order to provide the Public Works Department with the resources needed to maintain and expand the infrastructure.

WASTEWATER COLLECTION SYSTEM REHABILITATION PROGRAM

This Chapter presents options of probable project costs for system improvements and service extensions recommended in other sections of this report. The end result of this study is a Program that itemizes suggested improvements by basin for existing and future conditions. Although the program set forth in this section covers existing and future conditions, the Program should be reviewed and updated annually as part of the City's continuous endeavor to maintain an adequate sewage collection and treatment system. Proactive planning up front will enable the City to serve its current population and anticipated service area growth satisfactorily.

The Program summarizes the results presented in Sections 3, 4 and 5. They include the rehabilitation and replacement of structurally failing infrastructure identified during the field inspections, and capacity deficiencies in the collection system during the 5-year, 24-hour design storm identified during the hydraulic modeling and pump station deficiencies identified through the analysis of existing pump stations. When fully implemented, the Program will allow the conveyance of peak wet weather flows to the WWTP during both existing and future conditions.

7.1 PROGRAM DEVELOPMENT

The Program recommendations are divided into two categories based on the type and severity of the deficiency. Category 1 Program recommendations include Priority 1 defects identified during the field inspection, existing capacity improvements identified during the hydraulic modeling and pump station deficiencies. Category 2 Program recommendations included Priority 2 defects identified during the field inspection, future capacity improvements identified during the hydraulic modeling and pump station deficiencies The Category 1 recommendation should be performed immediately and the Category 2 recommendations should be phased in as funds are available. Located in Appendix E is a Map graphically showing the locations of the proposed recommendations.

7.2 PROGRAM COST ESTIMATES

Order-of-magnitude construction and project costs were developed for each project identified in the respective systems' evaluation phase presented in previous sections. Individual projects are discussed in detail in Sections 3, 4, and 5. Appendix F illustrates an expanded Program Cost Estimate Summary broken down by basin and recommendation type. More detailed description and locations maps of the recommendations are included in Appendix D, Attachment A1, and Attachment A2.

Table 7.1 provides project cost information required to complete construction and installation of the identified rehabilitation improvements for priority 1.

Table 7.1 Category 1 Cost Summary for Priority 1 Rehabilitation
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Type	Total Cost
Manhole Rehabilitation Priority 1	$41,193
Private Sector Rehabilitation Priority 1	$26,100
Public Sector Rehabilitation Priority 1	$60,866
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report) Priority 1	$9,450
Mainline Rehabilitation Priority 1	$69,741
Total Estimated Cost Priority 1	$207,350

The costs for Hydraulic Model Recommendations are based on construction bids received for projects in similar communities in the Midwest region. The unit costs are for “typical” field conditions with construction in stable soil at an average depth of ten feet. The construction cost estimate for new pipelines used in developing the Program is based upon the unit costs presented in Table 7.2. These unit costs include pipe and pipe installation, manhole and appurtenances, excavation and backfill, pavement removal and replacement, limited sheeting, dewatering and shoring, and contractor overhead and profit.

Table 7.2 Category 1 Cost Summary for Hydraulic Model Recommendations

Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Problem ID	Basin	Manhole		General Location	Diameter (in		Length (ft)	Unit Cost $/ft[1,2]	Total Cost $
		Upstream	Downstream		Existing	Proposed			
EX-17-1	17	G27-179	G27-177	Along 34th Ave. between 12th St. and 11th St.	12	18	345.9	165	57,078
EX-10-1	10	E28-009	LS-AT	About 1,500 ft east of MS Hwy 19 and N. HILL St.	16	21	3119.0	186	580,138
EX-8-1	8	F25-036	F25-030	About 600 ft north of I29 and 49th St., between 5	24	30	1431.4	248	354,993
EX-10-2	10	F30-175	F30-158	East of Oak Dr. between Bounds Rd. and Spruce St.	10	18	1199.8	165	197,972
EX-10-3	10	F31-070	F30-185	300 ft east of Bounds Rd. and 62nd Ave. 17th St. a	10	18	999.6	165	164,935
EX-18-1	20	G29-032	G28-053	Along 33rd Ave., between 17th St. and 21st St.	10	18	1430.5	165	236,039
EX-12-1	12	G25-017	G25-015	East of 49th St., between 1st St. and Front Rd.	18	24	1164.5	207	241,043
EX-1-1	1	G25-043	G25-029	North of I20 between 49th Ave. and 31st Ave.	24	30	1005.6	248	249,385
EX-17-2	17	G26-268	G25-078	Along 36th Ave., between 2nd St. and Interchange	27	36	593.5	289	171,519
EX-27-1	27	I28-069	I27-080	North of 8th Ave., between B St. and US Hwy 45	15	24	2390.1	207	494,755
EX-13-1	13	G28-152	G26-128	Along 45th Ave., between 14th St. and 5th St.	24	36	3556.4	289	1,027,799
EX-17-3	17	G27-183	G27-163	Along 34th St. between 12th St. and 10th St.	12	21	1004.1	186	186,770
EX-15-1	15	G32-078	G31-131	Along 34th Ave., 35th Ave. and 36th Ave.	10	18	2927.1	165	482,968
Total									**4,445,394**

Notes:
1. Unit costs include pipe and pipe installation, manhole and appurtenances, lower laterals, excavation and backfill, pavement removal and replacement, limited sheeting, dewatering and shoring, and contractor overhead and profit.
2. $/lf = unit cost per lineal foot. Cost does not include construction contingency or administrative costs.

The costs for the Lift Stations are based on opinion of probable constructions costs for projects in similar communities in the Midwest region. The unit costs are for “typical” field conditions with construction in stable soil. These unit costs include installation, appurtenances, excavation and backfill, pavement removal and replacement, limited sheeting, and dewatering and shoring.

Table 7.3 Priority 1 Cost Summary Lift Station Recommendations
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Pump Station	Design Flow with estimated 20% Growth (gpm)	Total Cost
Red Lobster	1,500	$423,856
Newell Rd #1	900	$358,488
Hwy 39 #1	800	$318,656
65th Ave.	2,400	$470,294

Category 2 recommendations are summarized in Tables 7.4, 7.5, and 7.6. These tables represent the, the Priority 2 recommendations from the evaluation study performed by Pipeline Analysis, hydraulic model recommendations for future flows and pump station improvements for future flows. More detailed description and locations maps of the recommendations are included in Appendix D, Appendix F, Attachment A1, and Attachment A2.

Table 7.4 provides project cost information required to complete construction and installation of the identified rehabilitation improvements for priority 2.

Table 7.4 Category 2 Cost Summary for Priority 2 Rehabilitation
Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Type	Total Cost
Manhole Rehabilitation Priority 2	$166,061
Private Sector Rehabilitation Priority 2	$35,850
Public Sector Rehabilitation Priority 2	$1,386,273
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report) Priority 2	$43,450
Mainline Rehabilitation Priority 2	$295,244
Total Estimated Cost Priority 2	$1,926,878

Table 7.5 Category 2 Cost Summary for Hydraulic Model Recommendations

Wastewater Collection System Rehabilitation Program
City of Meridian, MS

Problem ID	Basin	Manhole		General Location	Diameter (in		Length (ft)	Unit Cost $/ft[1,2]	Total Cost $
		Upstream	Downstream		Existing	Proposed			
FUT-5-1	5	J33-004	J31-050	Between N. Hills St. and Old US Hwy 45	10	18	5027.0	165	829,455
Total									**829,455**

Notes:
1. Unit costs include pipe and pipe installation, manhole and appurtenances, lower laterals, excavation and backfill, pavement removal and replacement, limited sheeting, dewatering and shoring, and contractor overhead and profit.
2. $/lf = unit cost per lineal foot. Cost does not include construction contingency or administrative costs.

Appendix A
Collection System Network Inventory

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
1	5	I32-030	M	Y	821 46TH ST.	TW	U	A	42	N	N	48	C	26.20	I32-030A0001.jpg	I32-030I0002.jpg	32.40678	-88.68661	S		6
2	5	I32-038	M	Y	4521 9TH AVE.	TW	U	A	4	N	N	48	C	8.47	I32-038A0001.jpg	I32-038I0002.jpg	32.40639	-88.68536	S		2
3	5	I32-052	M	Y	4508 7TH CT.	TW	U	A	??	N	N	48	C	5.98	No Area Photo	No Internal Photo	32.40572	-88.68400	S		0
4	5	I32-053	M	Y	4508 7TH CT.	YD	U	A	4	N	N	48	C	5.24	No Area Photo	No Internal Photo	32.40542	-88.68400	S		0
5	5	I32-054	M	Y	4501 HWY 39N	YD	U	A	2	N	N	48	C	5.96	I32-054A0019.jpg	I32-054I0020.jpg	32.40403	-88.68269	S		0
6	5	I32-055	M	Y	4315 HWY 39 SOUTH	TW	U	A	15	Y	N	48	C	12.91	I32-055A0050.jpg	I32-055I0051.jpg	32.40400	-88.68230	S		0
7	5	I32-056	M	L	4501 HWY 39N	ST	P								No Area Photo	No Internal Photo					
8	5	I32-057	M	Y	4501 HWY 39 N.	YD	U	A	8	N	N	48	C	5.85	I32-057A0014.jpg	I32-057I0015.jpg	32.40364	-88.68178	S		0
9	5	I32-058	M	Y	4501 HWY 39 N.	YD	U	B	5	Y	N	48	C	11.70	I32-058A0007.jpg	I32-058I0008.jpg	32.40311	-88.68066	S		0
10	5	I32-059	M	Y	4501 HWY 39 N.	YD	U	A	27	N	N	48	C	9.90	I32-059A0001.jpg	I32-059I0002.jpg	32.40375	-88.68044	S		6
11	5	I32-061	M	Y	4315 HWY 39 SOUTH	TW	U	A	2	N	L	48	C	7.02	I32-061A0057.jpg	I32-061I0058.jpg	32.40434	-88.68025	S		0
12	5	I32-061A	M	Y	4501 HWY 39N (BLDG 17)	YD	U	A	1	N	M	48	C	16.47	I32-061AA0001.jpg	I32-061AI0002.jpg	32.40506	-88.68014	S		0
13	5	I32-061B	M	Y	4501 HWY 39N (BLDG 17)	YD	U	A	1	N	M	48	C	8.93	I32-061BA0010.jpg	I32-061BI0011.jpg	32.40514	-88.68014	S		0
14	5	I32-061C	M	L	4501 HWY 39N	ST	P								No Area Photo	No Internal Photo					
15	5	I32-061D	M	Y	4501 HWY 39N (BLDG 4)	YD	U	A	5	N	N	48	C	6.02	I32-061DA0020.jpg	I32-061DI0021.jpg	32.40547	-88.65239	S		0
16	5	I32-061E	M	Y	4501 HWY 39N (OFFICE)	PL	P	X		N	N	48	C	12.74	I32-061EA0014.jpg	I32-061EI0015.jpg	32.40511	-88.68092	S		0
17	5	I32-061G	M	Y	4501 HWY 39N (BLDG 6)	YD	U	B	2	N	M	48	C	5.99	I32-061GA0027.jpg	I32-061GI0028.jpg	32.40561	-88.68189	S		0
18	5	I32-061I	M	Y	4501 HWY 39N (BLDG 8)	PL	P	X		N	L	48	C	5.87	I32-061IA0033.jpg	I32-061II0034.jpg	32.40547	-88.68259	S		0
19	5	I32-061L	M	Y	4501 HWY 39N (APT 15)	YD	U	B	2	N	N	48	C	10.24	I32-061LA0005.jpg	I32-061LI0006.jpg	32.40478	-88.68242	S		2
20	5	I32-061M	M	Y	4501 HWY 39N (APT 13)	YD	U	A	8	N	N	48	C	7.09	I32-061MA0001.jpg	I32-061MI0002.jpg	32.40480	-88.68172	S		0
21	5	I32-065	M	Y	4603 STATE HWY 39	YD	U	B	5	N	M	48	B	3.36	I32-065A0044.jpg	I32-065I0045.jpg	32.40619	-88.67905	S		0
22	5	I32-067	M	Y	4524 HWY 39N	TW	U	A	13	N	N	48	SB	4.52	I32-067A0012.jpg	I32-067I0013.jpg	32.40647	-88.67828	S		0
23	5	I32-068	M	Y	4524 HWY 39 N.	YD	U	X		N	N	48	B	8.79	I32-068A0011.jpg	I32-068I0012.jpg	32.40594	-88.67839	S		1
24	5	I32-069	M	Y	4400 HWY 39	SH	U	X		N	L	48	C	7.92	I32-069A0020.jpg	I32-069I0021.jpg	32.40519	-88.67828	S		0
25	5	I32-070	M	Y	4400 HWY 39	YD	U	A	1	N	N	48	B	13.65	I32-070A0015.jpg	I32-070I0016.jpg	32.40480	-88.67825	S		0
26	5	I32-071	M	Y	4520 HWY 39	TW	U	A	10	N	N	48	C	8.78	I32-071A0001.jpg	I32-071I0002.jpg	32.40447	-88.67819	S		0
27	5	I32-072	M	Y	4524 HWY 39N (APT A, 1-16)	YD	U	A	27	N	N	48	C	8.41	I32-072A0001.jpg	I32-072I0002.jpg	32.40622	-88.67770	S		4
28	5	I32-076	M	B	4524 HWY 39N (APT A, 1-16)	SH	U	B	10						I32-076A0068.jpg	No Internal Photo	32.40594	-88.67753			
29	5	I32-077	M	Y	4524 HWY 39N (APT B 1-16)	YD	U	A	1	N	N	48	C	7.44	I32-077A0007.jpg	I32-077I0008.jpg	32.40553	-88.67728	S		0
30	5	I32-078	M	Y	4524 HWY 39N (APT B, 1-16)	TW	U	A	14	N	N	48	C	6.99	I32-078A0012.jpg	I32-078I0013.jpg	32.40522	-88.67706	S		3
31	5	I32-083	M	B	4524 HWY 39N (APT B, 17-32)	YD	U	B	12						I32-083A0067.jpg	No Internal Photo	32.40511	-88.67672			
32	5	I32-084	M	B	4524 HWY 39N (APT B, 30-38)	OT	P	B	8						I32-084A0018.jpg	No Internal Photo	32.40486	-88.67636			
33	5	I32-085	M	Y	4524 HWY 39N (APT B, 30-38)	YD	U	X		N	N	48	C	6.62	I32-085A0019.jpg	I32-085I0020.jpg	32.40464	-88.67625	S		2
34	5	I32-085A	M	Y	4524 HWY 39N (APT C, 25-40)	YD	U	X		N	N	48	C	4.21	I32-085AA0025.jpg	I32-085AI0026.jpg	32.40478	-88.67597	S		0
35	5	I32-085B	M	Y	4520 HWY 39	TW	U	A	8	N	N	48	C	10.30	I32-085BA0008.jpg	I32-085BI0009.jpg	32.40422	-88.67633	S		0
36	5	I33-075	M	Y	900 46TH ST.	DW	P	X		N	N	48	C	4.52	I33-075A0001.jpg	I33-075I0002.jpg	32.40689	-88.68714	S		0
37	5	I33-076	M	N	821 46TH CT.	SH	U	A	3						No Area Photo	No Internal Photo	32.40686	-88.68658			
38	5	I33-077	M	Y	900 46TH ST.	YD	U	A	2	N	N	48	C	10.24	I33-077A0008.jpg	I33-077I0009.jpg	32.40725	-88.68616	S		0
39	5	I33-078	M	Y	900 46TH ST.	TW	U	A	3	N	N	48	C	12.71	I33-078A0016.jpg	I33-078I0017.jpg	32.40703	-88.68616	S		0
40	5	I33-081	M	Y	5018 6TH PLACE	SH	U	X		N	L	48	C	4.82	I33-081A0040.jpg	I33-081I0041.jpg	32.41191	-88.68461	S		0
41	5	I33-082	M	Y	5012 6TH PLACE	YD	U	A	5	N	L	48	C	7.56	I33-082A0049.jpg	I33-082I0050.jpg	32.41122	-88.68447	S		0
42	5	I33-085	M	Y	4912 6TH AVE	TW	U	A	42	N	N	48	C	12.82	I33-085A0001.jpg	I33-085I0002.jpg	32.41050	-88.68439	S		0
43	5	I33-086	M	Y	4823 5TH AVE.	TW	U	A	5	N	N	48	B	4.50	I33-086A0024.jpg	I33-086I0025.jpg	32.41008	-88.68414	S		0
44	5	I33-087	M	Y	4823 5TH AVE.	TW	U	X		N	L	48	B	5.38	I33-087A0015.jpg	I33-087I0016.jpg	32.40989	-88.68406	S		0
45	5	I33-088	M	Y	4823 5TH AVE.	SH	U	A	18	N	L	48	B	13.42	I33-088A0007.jpg	I33-088I0008.jpg	32.40981	-88.68344	V	4	0
46	5	I33-089	M	Y	4924 5TH AVE.	SH	U	A	7	N	M	48	B	6.60	I33-089A0067.jpg	I33-089I0068.jpg	32.41089	-88.68350	S		3
47	5	I33-090	M	Y	5013 5TH AVE.	YD	U	B	2	N	L	48	B	6.57	I33-090A0058.jpg	I33-090I0059.jpg	32.41156	-88.68339	S		0
48	5	I33-091	M	Y	4901 5TH AVE	YD	U	A	2	N	M	48	SB	4.78	I33-091A0001.jpg	I33-091I0002.jpg	32.41019	-88.68353	S		0
49	5	I33-092	M	Y	5027 5TH AVE. @ 51ST ST.	DW	P	X		N	M	48	B	8.91	I33-092A0051.jpg	I33-092I0052.jpg	32.41233	-88.68347	S		0
50	5	I33-093	M	L	4715 5TH AVE.	DD	U								No Area Photo	No Internal Photo					
51	5	I33-094	M	Y	4715 5TH AVE. @ 47TH CT.	YD	U	B	1	N	M	54	C	7.38	I33-094A0018.jpg	I33-094I0019.jpg	32.40792	-88.68344	S		0
52	5	I33-095	M	Y	440 48TH CT. @ 5TH AVE.	SH	U	B	2	N	M	48	C	8.22	I33-095A0014.jpg	I33-095I0015.jpg	32.40928	-88.68342	S		0

Definitions:
Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
53	5	I33-096	M	Y	4617 5TH AVE.	YD	U	X		N	L	54	C	6.82	I33-096A0021.jpg	I33-096I0022.jpg	32.40739	-88.06842	S		0
54	5	I33-097	M	Y	4610 5TH AVE. @ 46TH CT.	SH	U	X		N	M	54	C	6.40	I33-097A0028.jpg	I33-097I0029.jpg	32.40694	-88.68339	S		0
55	5	I33-098	M	Y	518 51ST STREET	YD	U	A	0.25	N	L	48	B	8.17	I33-098A0045.jpg	I33-098I0046.jpg	32.41261	-88.68333	S		0
56	5	I33-099	M	Y	518 51ST STREET	YD	U	B	1	N	L	48	B	7.58	I33-099A0038.jpg	I33-099I0039.jpg	32.41264	-88.68314	S		0
57	5	I33-100	M	Y	421 47TH COURT	SH	U	A	6	N	L	48	C	7.20	I33-100A0023.jpg	I33-100I0024.jpg	32.40781	-88.68283	S		0
58	5	I33-101	M	Y	4823 5TH AVE	TW	U	A	16	N	N	48	SB	6.80	I33-101A0016.jpg	I33-101I0017.jpg	32.40975	-88.68303	S		2
59	5	I33-102	M	Y	430 46TH CT.	YD	U	A	1.5	N	M	54	C	14.31	I33-102A0037.jpg	I33-102I0038.jpg	32.40689	-88.68247	S		0
60	5	I33-103	M	Y	5016 4TH PLACE	FD	U	A	36	N	L	48	SB	6.10	I33-103A0010.jpg	I33-103I0011.jpg	32.41164	-88.68214	S		0
61	5	I33-103A	E	N	5017 4TH PLACE	YD	U							0.00	I33-103AA0017.jpg	No Internal Photo	32.41164	-88.68239			
62	5	I33-104	M	Y	421 47TH COURT	SH	U	A	4	N	M	48	C	10.30	I33-104A0015.jpg	I33-104I0016.jpg	32.40786	-88.68228	S		0
63	5	I33-105	M	Y	349 48TH CT @ 4TH PLACE	SH	U	B	22	N	M	48	C	6.35	I33-105A0002.jpg	I33-105I0003.jpg	32.40922	-88.68220	S		8
64	5	I33-106	M	Y	349 48TH CT ON 4TH PLACE	SH	U	B	13	N	M	48	C	5.70	I33-106A0006.jpg	I33-106I0007.jpg	32.40881	-88.68214	S		4
65	5	I33-107	M	O	349 48TH CT @ 4TH PLACE	SH	U	B	24	N	M			0.00	I33-107A0001.jpg	No Internal Photo	32.40931	-88.68214	S		
66	5	I33-108	M	Y	414 51ST STREET	YD	U	B	1	N	M	36	B	4.37	I33-108A0032.jpg	I33-108I0033.jpg	32.41264	-88.68220	S		0
67	5	I33-109	M	Y	4715 4TH PLACE	SH	U	A	25	N	L	48	C	9.43	I33-109A0033.jpg	I33-109I0034.jpg	32.40822	-88.68203	S		0
68	5	I33-110	M	Y	423 49TH CT.	TW	U	A	24	N	N	48	C	5.36	No Area Photo	No Internal Photo	32.40975	-88.67934	V	2	0
69	5	I33-111	M	Y	349 48TH COURT	SH	U	B	6	N	M	48	C	5.86	I33-111A0008.jpg	I33-111I0009.jpg	32.40933	-88.68197	S		0
70	5	I33-112	M	Y	4624 4TH PLACE @ 47TH CT.	SH	U	A	4	N	L	48	C	6.60	I33-112A0001.jpg	I33-112I0002.jpg	32.40800	-88.68189	S		10
71	5	I33-116	M	B	420 46TH CT.	YD	U	B	12						I33-116A0042.jpg	No Internal Photo	32.40694	-88.68164			
72	5	I33-119	M	Y	4624 4TH PLACE	YD	U	A	5	N	M	48	C	7.32	I33-119A0007.jpg	I33-119I0008.jpg	32.40778	-88.68172	S		0
73	5	I33-121	M	Y	349 48TH COURT	SH	U	B	13	N	M	48	C	5.48	I33-121A0001.jpg	I33-121I0002.jpg	32.40914	-88.68158	S		0
74	5	I33-122	M	Y	413 46TH CT. @ 4TH PLACE	SH	U	B	12	N	L	54	C	4.98	I33-122A0043.jpg	I33-122I0044.jpg	32.40692	-88.68161	S		0
75	5	I33-123	M	Y	349 48TH CIURT	FD	U	A	52	N	N	48	C	8.75	I33-123A0018.jpg	I33-123I0019.jpg	32.40855	-88.68175	S		0
76	5	I33-126	M	Y	5021 4TH AVE.	YD	U	B	1	N	M	48	B	5.03	I33-126A0026.jpg	I33-126I0027.jpg	32.41230	-88.68142	S		0
77	5	I33-127	M	Y	5005 4TH AVE.	DW	P	X		N	M	48	B	7.37	I33-127A0018.jpg	I33-127I0019.jpg	32.41153	-88.68136	S		0
78	5	I33-129	M	Y	349 48TH CT.	SH	U	A	5	N	L	48	C	9.56	I33-129A0073.jpg	I33-129I0074.jpg	32.40886	-88.68134	OT		0
79	5	I33-130	M	Y	4931 4TH AVE.	YD	U	X		N	M	36	B	5.97	I33-130A0011.jpg	I33-130I0012.jpg	32.41111	-88.68134	S		0
80	5	I33-132	M	Y	4921 4TH AVE.	YD	U	B	0.5	N	M	36	B	3.35	I33-132A0005.jpg	I33-132I0006.jpg	32.41095	-88.68142	S		0.5
81	5	I33-133	M	Y	409 49TH CT.	YD	U	B	6	N	M	48	B	4.70	I33-133A0034.jpg	I33-133I0035.jpg	32.41042	-88.68142	S		0
82	5	I33-134	M	Y	4921 4TH AVE.	YD	U	B	0.5	N	M	36	B	3.37	I33-134A0001.jpg	I33-134I0002.jpg	32.41061	-88.68144	S		0
83	5	I33-135	M	Y	349 48TH CT.	SH	U	A	6	N	L	48	C	5.38	I33-135A0068.jpg	I33-135I0069.jpg	32.40875	-88.08114	S		12
84	5	I33-136	M	Y	334 46TH CT.	YD	U	A	3	N	L	54	C	7.80	I33-136A0047.jpg	I33-136I0048.jpg	32.40714	-88.68103	S		0
85	5	I33-137	M	Y	NONE 48TH CT.	TW	U	A	3	N	N	48	C	5.44	I33-137A0054.jpg	I33-137I0055.jpg	32.40931	-88.68108	V	4	0
86	5	I33-138	M	Y	333 49TH CT.	TW	U	A	21	N	N	48	C	6.65	I33-138A0046.jpg	I33-138I0047.jpg	32.40978	-88.68108	S		0
87	5	I33-139	M	Y	349 48TH COURT	SH	U	B	5	N	M	48	C	5.00	I33-139A0005.jpg	I33-139I0006.jpg	32.40842	-88.68103	S		18
88	5	I33-140	M	Y	none 49TH CT.	DD	U	A	62	N	N	48	C	7.50	I33-140A0061.jpg	I33-140I0062.jpg	32.40925	-88.68092	S		0
89	5	I33-141	M	Y	321 49TH CT.	YD	U	B	4	N	M	48	B	7.22	I33-141A0026.jpg	I33-141I0027.jpg	32.41053	-88.68095	S		0
90	5	I33-142	M	Y	321 49TH CT.	TW	U	A	66	N	N	48	C	8.40	I33-142A0008.jpg	I33-142I0009.jpg	32.41003	-88.68073	S		0
91	5	I33-144	M	Y	321 46TH CT. ACROSS STREET.	SH	U	A	4	N	L	48	C	4.79	I33-144A0054.jpg	I33-144I0055.jpg	32.40733	-88.68047	S		0
92	5	I33-145	M	S	321 46TH CT ON 48TH CT.	SH	U	B	6	N	L	48	C	0.00	I33-145A0067.jpg	No Internal Photo	32.40789	-88.68061	S		0
93	5	I33-146	M	Y	??? HWY 39	TW	U	A	8	N	L	48	C	5.95	I33-146A0001.jpg	I33-146I0002.jpg	32.40919	-88.68061	S		0
94	5	I33-147	M	Y	4914 3RD PL.	TW	U	B	4	N	M	48	C	6.98	I33-147A0001.jpg	I33-147I0002.jpg	32.41011	-88.68042	S		0
95	5	I33-149	M	Y	321 46TH CT. @ 48TH CT.	SH	U	A	2	N	L	48	C	5.72	I33-149A0060.jpg	I33-149I0061.jpg	32.40770	-88.68039	S		0
96	5	I33-150	M	Y	321 49TH CT.	YD	U	A	4	N	L	48	B	6.68	I33-150A0019.jpg	I33-150I0020.jpg	32.41053	-88.68042	S		0
97	5	I33-152	M	Y	??? HWY 39	DD	U	A	48	N	N	48	C	5.57	I33-152A0006.jpg	I33-152I0007.jpg	32.40847	-88.68022	S		0
98	5	I33-153	M	Y	301 46TH CT. @ 48TH CT.	TW	U	B	10	N	M	48	C	5.26	I33-153A0086.jpg	I33-153I0087.jpg	32.40786	-88.68025	S		0
99	5	I33-154	M	Y	4914 3RD PL.	YD	U	A	1	N	L	48	B	6.67	I33-154A0013.jpg	I33-154I0014.jpg	32.41058	-88.68025	S		2
100	5	I33-158	M	Y	4920 3RD PL.	YD	U	B	0.5	N	L	48	B	7.06	I33-158A0008.jpg	I33-158I0009.jpg	32.41078	-88.68014	S		0
101	5	I33-160	M	Y	4914 3RD PL.	YD	U	X		N	L	48	C	8.60	I33-160A0040.jpg	I33-160I0041.jpg	32.41008	-88.68000	S		0
102	5	I33-161	M	Y	301 46TH COURT	SH	U	A	20	N	L	48	C	8.10	I33-161A0061.jpg	I33-161I0062.jpg	32.40789	-88.67934	S		4
103	5	I33-162	M	Y	301 46TH COURT	TW	U	B	8	N	M	36	B	4.10	I33-162A0080.jpg	I33-162I0081.jpg	32.40731	-88.67925	S		0
104	5	I33-163	M	Y	301 46TH COURT	YD	U	B	2	N	M	48	C	5.90	I33-163A0072.jpg	I33-163I0073.jpg	32.40742	-94.67928	V	4	0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
105	5	I33-163A	M	Y	301 46TH COURT	PL	P	X		N	M	48	B	8.68	I33-163AA0067.jpg	I33-163AI0068.jpg	32.40783	-88.67925	V	4	0.5
106	5	I33-164	M	Y	4603 STATE HWY 39	DW	P	B	1	N	M	48	C	6.08	I33-164A0038.jpg	I33-164I0039.jpg	32.40714	-88.67928	S		0
107	5	I33-165	M	Y	4603 STATE HWY 39	YD	U	B	1	N	M	48	C	12.52	I33-165A0054.jpg	I33-165I0055.jpg	32.40670	-88.67919	S		0
108	5	I33-171A	M	Y	4728 HWY 39 NORTH	YD	U	X		N	N	48	C	9.76	I33-171AA0034.jpg	I33-171AI0035.jpg	32.40794	-88.67825	S		0
109	5	I33-171B	M	Y	4728 HWY 39 NORTH	PL	P	X		N	N	48	C	8.60	I33-171BA0041.jpg	I33-171BI0042.jpg	32.40825	-88.67817	S		0
110	5	I33-171C	M	Y	4728 HWY 39 NORTH	SW	P	X		N	N	48	C	5.62	I33-171CA0046.jpg	I33-171CI0047.jpg	32.40867	-88.67805	S		0
111	5	J32-001	M	L	4524 HWY 39N	ST	P								No Area Photo	No Internal Photo					
112	5	J32-002	M	Y	4524 HWY 39 N.	ST	P	X		N	N	48	C	5.28	J32-002A0001.jpg	J32-002I0002.jpg	32.40475	-88.67486	S		2
113	5	J32-002A	M	Y	4524 HWY39N (APT C, 73-88)	YD	U	A	8	N	N	48	C	4.56	J32-002AA0035.jpg	J32-002AI0036.jpg	32.40469	-88.67506	S		0
114	5	J32-002B	M	Y	4524 HWY 39N APT C, (73-88)	YD	U	A	2	N	N	48	C	4.54	J32-002BA0040.jpg	J32-002BI0041.jpg	32.40508	-88.67533	S		2
115	5	J32-003	M	Y	4524 HWY 39 N.	YD	U	X		N	N	48	C	4.30	J32-003A0006.jpg	J32-003I0007.jpg	32.40464	-88.67494	S		0
116	5	J32-003A	M	Y	4524 HWY 39 N.	TW	U	A	24	N	N	48	C	7.24	J32-003AA0010.jpg	J32-003AI0011.jpg	32.40380	-88.67500	S		0
117	5	J32-003B	M	Y	4524 HWY 39 N.	TW	U	A	12	N	N	48	C	7.27	J32-003BA0005.jpg	J32-003BI0006.jpg	32.40392	-88.67503	S		0
118	5	J32-003C	M	Y	4524 HWY 39 N.	TW	U	A	53	N	N	48	C	7.22	J32-003CA0001.jpg	J32-003CI0002.jpg	32.40369	-88.67492	S		0
119	5	J32-004	M	Y	4524 HWY 39N (APT D, 49-64)	YD	U	A	3	N	N	48	C	10.20	J32-004A0061.jpg	J32-004I0062.jpg	32.40611	-88.67439	S		0
120	5	J32-004A	E	N	4524 HWY 39N (APT D, 49-64)	YD	U								J32-004AA0066.jpg	No Internal Photo	32.40644	-88.67436			
121	5	J32-005	M	Y	4524 HWY 39N (APTD, 49-64)	YD	U	A	6	N	N	48	B	8.96	J32-005A0054.jpg	J32-005I0055.jpg	32.40561	-88.67439	S		6
122	5	J32-006	M	Y	4524 HWY 39N (APTC, (73-88)	YD	U	A	4	N	N	48	SB	7.14	J32-006A0046.jpg	J32-006I0047.jpg	32.40478	-88.67433	S		1
123	5	J32-007	M	Y	217 45TH CT.@ "B" PLACE	YD	U	A	0.25	N	M	48	C	5.47	J32-007A0055.jpg	J32-007I0056.jpg	32.40606	-88.67384	S		2
124	5	J32-008	M	Y	4413 "B" PLACE @ 44TH COURT	YD	U	B	2	N	M	48	C	4.56	J32-008A0030.jpg	J32-008I0031.jpg	32.40450	-88.67394	S		0
125	5	J32-009	M	Y	216 45TH CT. ON "B" PLACE	YD	U	A	3	N	M	48	C	5.20	J32-009A0114.jpg	J32-009I0115.jpg	32.40575	-88.67389	S		0
126	5	J32-010	M	Y	444 "B" PLACE @ 44TH COURTT.	YD	U	B	2	N	M	48	C	6.32	J32-010A0006.jpg	J32-010I0007.jpg	32.40469	-88.67384	S		0
127	5	J32-010A	M	Y	4500 "B" PLACE	YD	U	A	0.25	N	M	48	C	4.56	J32-010AA0001.jpg	J32-010AI0002.jpg	32.40522	-88.67384	S		0
128	5	J32-011	M	Y	301 44TH COURT	YD	U	B	3	N	M	48	B	6.33	J32-011A0013.jpg	J32-011I0014.jpg	32.40464	-88.67347	S		0
129	5	J32-012	M	Y	309 45TH CT. @ "C" PLACE	YD	U	A	3	N	L	48	C	10.20	J32-012A0060.jpg	J32-012I0061.jpg	32.40597	-88.67300	S		0
130	5	J32-012A	M	Y	315 45TH COURT	YD	U	B	0.5	N	M	48	C	4.61	J32-012AA0109.jpg	J32-012AI0110.jpg	32.40619	-88.67255	S		0
131	5	J32-013	M	Y	314 45TH ST ON "C" PLACE	YD	U	A	2	N	L	48	C	7.24	J32-013A0022.jpg	J32-013I0023.jpg	32.40447	-88.67281	S		0
132	5	J32-014	M	Y	4501 C PLACE @ 45TH ST	YD	U	A	0.25	N	L	48	C	7.38	J32-014A0074.jpg	J32-014I0075.jpg	32.40511	-88.67300	S		0
133	5	J32-014A	M	Y	200 45TH CT. ON "C" PLACE	DW	P	X		N	M	48	C	9.30	J32-014AA0069.jpg	J32-014AI0070.jpg	32.40580	-88.67297	S		0
134	5	J32-015	M	Y	314 45TH ST ON "C" PLACE	YD	U	A	6	N	L	48	C	6.86	J32-015A0018.jpg	J32-015I0019.jpg	32.40456	-88.67286	S		0
135	5	J32-015A	M	Y	216 44TH CT. @ "B" PLACE	YD	U	A	0.5	N	L	48	C	4.79	J32-015AA0025.jpg	J32-015AI0026.jpg	32.40453	-88.67403	S		0
136	5	J32-016	M	Y	314 45TH ST (BACKYARD)	YD	U	A	7	N	L	48	SB	6.15	J32-016A0026.jpg	J32-016I0027.jpg	32.40456	-88.67261	S		0
137	5	J32-017	M	Y	313 45TH STREET	YD	U	A	1.5	N	L	48	C	6.82	J32-017A0080.jpg	J32-017I0081.jpg	32.40503	-88.67253	S		0
138	5	J32-019	M	Y	409 45TH COURT	YD	U	A	4	N	L	48	C	8.96	J32-019A0094.jpg	J32-019I0095.jpg	32.40603	-88.67208	S		0
139	5	J32-020	M	Y	408 45TH COURT	ST	P	X		N	L	48	C	11.32	J32-020A0089.jpg	J32-020I0090.jpg	32.40597	-88.67203	S		0
140	5	J32-023A	M	Y	324 45TH COURT	YD	U	A	4	N	L	48	C	9.98	J32-023AA0084.jpg	J32-023AI0085.jpg	32.40608	-88.67228	S		0
141	5	J32-024	M	Y	406 45TH ST.	TW	U	A	4	N	N	48	C	5.24	J32-024A0001.jpg	J32-024I0002.jpg	32.40491	-88.67169	S		3
142	5	J32-026	M	Y	423 45TH COURT	YD	U	B	3	N	M	48	C	7.18	J32-026A0100.jpg	J32-026I0101.jpg	32.40600	-88.67128	S		0
143	5	J32-026A	M	Y	423 45TH CT @ NEWELL RD	SH	U	A	4	N	L	48	C	5.44	J32-026AA0017.jpg	J32-026AI0018.jpg	32.40608	-88.67106	S		0
144	5	J32-027	M	Y	4001 NEWELL RD	SH	U	A	4	N	L	48	C	4.70	J32-027A0061.jpg	J32-027I0062.jpg	32.39928	-88.67128	S		3
145	5	J32-028	M	Y	4113 NEWELL RD	SH	U	A	7	N	N	48	C	4.66	J32-028A0056.jpg	J32-028I0057.jpg	32.40028	-88.67128	S		0
146	5	J32-029	M	Y	4223 NEWELL RD	SH	U	B	2	N	S	42	B	6.67	J32-029A0036.jpg	J32-029I0037.jpg	32.40286	-88.67122	S		0
147	5	J32-030	M	Y	4113 NEWELL RD	SH	U	A	5	N	N	48	C	4.60	J32-030A0052.jpg	J32-030I0053.jpg	32.40078	-88.67122	S		0
148	5	J32-031	M	Y	3055 NEWELL RD	SH	U	B	5	N	L	40	B	6.63	J32-031A0043.jpg	J32-031I0044.jpg	32.40205	-88.67120	S		0
149	5	J32-032	M	L	No # NEWELL RD	SH	U								No Area Photo	No Internal Photo					
150	5	J32-033	M	Y	4115 NEWELL RD	SH	U	B	1	N	M	36	B	7.65	J32-033A0047.jpg	J32-033I0048.jpg	32.40120	-88.67122	S		0
151	5	J32-042	M	Y	4505 NEWELL RD	SH	U	A	5	N	L	48	C	10.13	J32-042A0001.jpg	J32-042I0002.jpg	32.40378	-88.67111	S		3
152	5	J32-042A	M	Y	228 44TH CT @ C PLACE	TW	U	A	26	N	L	48	C	8.36	J32-042AA0030.jpg	J32-042AI0031.jpg	32.40372	-88.67175	S		0
153	5	J32-042B	M	Y	228 44TH CT @ C PLACE	TW	U	B	10	N	M	48	C	5.92	J32-042BA0025.jpg	J32-042BI0026.jpg	32.40408	-88.67269	S		0
154	5	J32-042C	M	Y	4505 NEWELL RD	SH	U	A	15	N	L	48	C	9.84	J32-042CA0001.jpg	J32-042CI0002.jpg	32.40483	-88.67108	S		0.25
155	5	J32-042D	M	Y	4505 NEWELL RD	SH	U	A	5	N	L	48	C	9.92	J32-042DA0007.jpg	J32-042DI0008.jpg	32.40480	-88.67091	S		0
156	5	J32-042E	M	Y	4511 NEWELL RD @ 45TH CT.	SH	U	A	3	N	M	48	C	17.70	J32-042EA0011.jpg	J32-042EI0012.jpg	32.40600	-88.67097	S		0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
157	5	J32-042F	M	Y	4505 NEWELL RD.	SH	U	A	40	N	N	48	C	9.90	J32-042FA0001.jpg	J32-042FI0002.jpg	32.40369	-88.67114	S		0
158	5	J32-043	M	Y	4505 NEWELL RD	SH	U	A	1	N	L	48	B	8.04	J32-043A0009.jpg	J32-043I0010.jpg	32.40375	-88.67111	S		0
159	5	J32-045	M	Y	4505 NEWELL ROAD	SH	U	A	12	N	L	48	C	10.06	J32-045A0018.jpg	J32-045I0019.jpg	32.40372	-88.67097	S		0
160	5	J32-152	M	Y	4501 C PLACE @ 45TH ST.	YD	U	X	0.25	N	L	48	C	7.38	No Area Photo	No Internal Photo	32.40511	-88.67300	S		0
161	5	J33-002	M	Y	136 NORTH HILLS ST	YD	U	A	10	N	N	48	SB	10.96	J33-002A0011.jpg	J33-002I0012.jpg	32.41136	-88.67536	S		0
162	5	J33-003	M	Y	136 NORTH HILLS ST	TW	U	A	18	N	N	48	B	13.50	J33-003A0007.jpg	J33-003I0008.jpg	32.41117	-88.67458	S		0
163	5	J33-004C	M	Y	5000 HWY 39	FD	U	A	6	N	N	48	B	4.62	J33-004CA0012.jpg	J33-004CI0013.jpg	32.40747	-88.67470	S		0
164	5	J33-004D	M	Y	5000 HWY 39	YD	U	B	4	N	M	48	B	4.30	No Area Photo	No Internal Photo	32.40944	-88.67545	S		0
165	5	J33-005	M	Y	4906 B PL.	TW	U	B	8	N	N	48	B	9.28	J33-005A0027.jpg	J33-005I0028.jpg	32.40950	-88.67339	S		2
166	5	J33-006	M	Y	4906 B PL.	TW	U	B	32	N	N	48	C	7.92	J33-006A0011.jpg	J33-006I0012.jpg	32.41011	-88.67372	S		2
167	5	J33-007	M	Y	5021 "B PL. @ 50TH CT.	YD	U	B	0.25	N	M	48	SB	7.33	J33-007A0009.jpg	J33-007I0010.jpg	32.41208	-88.67375	S		0
168	5	J33-008	M	Y	4923 "B" PL.	ST	P	X		N	M	48	SB	7.32	J33-008A0024.jpg	J33-008I0025.jpg	32.41067	-88.67377	S		0
169	5	J33-009	M	Y	5107 "B" PL.	DW	P	X		N	L	48	SB	9.51	J33-009A0008.jpg	J33-009I0009.jpg	32.41269	-88.67372	S		0
170	5	J33-010	M	Y	5003 "B" PL.	YD	U	X		N	L	48	SB	8.97	J33-010A0015.jpg	J33-010I0016.jpg	32.41130	-88.67377	S		0
171	5	J33-011	M	Y	208 NORTH HILLS ST. @ "B" PL.	DW	P	X		N	L	48	SB	6.46	J33-011A0001.jpg	J33-011I0002.jpg	32.41339	-88.67369	S		2
172	5	J33-012	M	Y	49.06 "B" PL.	YD	U	A	2.5	N	L	48	SB	8.12	J33-012A0028.jpg	J33-012I0029.jpg	32.41056	-88.67364	S		0
173	5	J33-012A	M	Y	4906 B PL.	YD	U	X		N	N	48	B	3.61	No Area Photo	No Internal Photo	32.41053	-88.67355	S		0
174	5	J33-013	M	Y	5016 "B" PLACE ON 50TH CT.	YD	U	B	0.5	N	L	48	SB	10.97	J33-013A0001.jpg	J33-013I0002.jpg	32.41211	-88.67345	S		0
175	5	J33-014	M	Y	315 45TH CT.	TW	U	A	3	N	N	48	B	9.20	J33-014A0023.jpg	J33-014I0024.jpg	32.40897	-88.67308	S		1
176	5	J33-015	M	Y	315 45TH CT.	TW	U	A	3	N	N	48	B	8.68	J33-015A0015.jpg	J33-015I0016.jpg	32.40831	-88.67269	S		3
177	5	J33-019	M	Y	315 45TH CT.	TW	U	A	2	N	N	48	C	7.72	J33-019A0008.jpg	J33-019I0009.jpg	32.40717	-88.67255	S		6
178	5	J33-020	M	Y	5113 "D" AVE.	YD	U	B	0.25	Y	L	48	SB	8.31	J33-020A0027.jpg	J33-020I0028.jpg	32.41292	-88.67245	S		0
179	5	J33-020B	M	Y	315 45TH CT.	TW	U	A	28	N	N	48	C	11.22	J33-020BA0001.jpg	J33-020BI0002.jpg	32.40667	-88.67247	S		0
180	5	J33-020C	M	Y	315 45TH CT.	TW	U	A	12	N	N	48	C	8.68	J33-020CA0008.jpg	J33-020CI0009.jpg	32.40703	-88.67264	S		0
181	5	J33-020D	M	Y	315 45TH CT.	TW	U	A	18	N	N	48	C	8.38	J33-020DA0012.jpg	J33-020DI0013.jpg	32.40761	-88.67278	S		0
182	5	J33-020E	M	Y	315 45TH CT.	TW	U	A	18	N	N	48	C	8.20	J33-020EA0017.jpg	J33-020EI0018.jpg	32.40805	-88.67284	S		0
183	5	J33-020F	M	Y	315 45TH CT.	TW	U	X	20	N	N	48	C	8.70	J33-020FA0021.jpg	J33-020FI0022.jpg	32.40836	-88.67284	S		0
184	5	J33-020G	M	Y	315 45TH CT.	TW	U	A	29	N	N	48	C	9.65	J33-020GA0025.jpg	J33-020GI0026.jpg	32.40900	-88.67306	S		0
185	5	J33-020H	M	Y	4906 B PL.	TW	U	A	16	N	N	48	C	9.86	J33-020HA0023.jpg	J33-020HI0024.jpg	32.40947	-88.67336	S		2
186	5	J33-020J	M	Y	4906 B PL.	TW	U	A	19	N	N	48	C	9.88	J33-020JA0018.jpg	J33-020JI0019.jpg	32.41006	-88.66739	S		4
187	5	J33-020K	E	N	4906 B PL.	WB	U								No Area Photo	No Internal Photo					
188	5	J33-021	M	Y	221 50TH COURT @ "D" AVE.	YD	U	B	5	N	L	48	SB	8.35	J33-021A0037.jpg	J33-021I0038.jpg	32.41211	-88.67245	S		0
189	5	J33-022	M	Y	315 45TH CT.	TW	U	A	3	N	N	48	C	6.84	J33-022A0001.jpg	J33-022I0002.jpg	32.40661	-88.67228	S		4
190	5	J33-023	M	Y	400 NEWELL RD.	TW	U	A	15	N	M	48	C	6.02	No Area Photo	No Internal Photo	32.40853	-88.67186	S		4
191	5	J33-024	M	Y	309 50TH COURT	YD	U	X		N	M	30	B	3.18	J33-024A0001.jpg	J33-024I0002.jpg	32.41211	-88.67181	S		0
192	5	J33-026B	M	Y	4605 NEWELL RD	SH	U	A	14	N	M	48	C	3.77	J33-026BA0021.jpg	J33-026BI0022.jpg	32.40675	-88.67106	S		0
193	5	J33-027	M	Y	4122 NEWELL RD	SH	U	A	36	N	N	48	SB	9.89	J33-027A0016.jpg	J33-027I0017.jpg	32.40855	-88.67103	S		0
194	5	J33-027A	M	Y	4719 NEWELL RD.	SH	U	A	26	N	N	48	C	6.84	No Area Photo	No Internal Photo	15.84000	-88.67108	S		4
195	5	J33-027B	M	Y	4122 NEWELL RD	SH	U	A	10	N	N	48	SB	5.46	J33-027BA0021.jpg	J33-027BI0022.jpg	32.40808	-88.67103	S		4
196	5	J33-027C	M	Y	4122 NEWWELL RD	SH	U	A	18	N	N	48	SB	4.68	J33-027CA0025.jpg	J33-027CI0026.jpg	32.40747	-88.67103	S		3
197	5	J33-027D	E	N	4815 NEWELL RD.	SH	U								No Area Photo	No Internal Photo	32.40739	-88.67097			
198	5	J33-027E	M	Y	4815 NEWELL RD.	SH	U	A	16	N	N	48	C	6.70	No Area Photo	No Internal Photo	32.40961	-88.67114	S		0
199	5	J33-027F	M	Y	4905 NEWELL RD.	SH	U	X		N	N	48	C	12.79	No Area Photo	No Internal Photo	32.41008	-88.67103	S		2
200	5	J33-033	M	Y	214 NORTH HILLS ST.	YD	U	A	0.5	N	L	36	SB	4.32	J33-033A0019.jpg	J33-033I0020.jpg	32.41370	-88.67286	S		0
201	5	J33-033A	E	Y	210 NORTH HOLLS ST.	YD	U	X		N	L			0.00	J33-033AA0026.jpg	No Internal Photo	32.41375	-88.67342			
202	5	J33-034	M	Y	218 NORTH HILLS ST. ON "D" AVE.	YD	U	A	0.5	N	L	36	SB	3.25	J33-034A0013.jpg	J33-034I0014.jpg	32.41367	-88.67239	S		0
203	17	G26-037	M	B	3827 5TH ST @ 39TH AVE.	ST	P	B							G26-037A0005.jpg	No Internal Photo	32.36055	-88.71677			
204	17	G26-038	M	B	3817 SMITH ST.	ST	P	B	4					0.00	G26-038A0047.jpg	No Internal Photo	32.36136	-88.71639			
205	17	G26-039	M	Y	611 UNION ALLEY	AL	U	A	1	N	L	36	B	3.55	G26-039A0027.jpg	G26-039I0028.jpg	32.36275	-88.71611	S		2
206	17	G26-040	M	Y	3927A SOUTH ST.	FD	U	A	10	N	L	48	B	6.85	G26-040A0001.jpg	G26-040I0002.jpg	32.35894	-88.71433	S		0
207	17	G26-041	M	Y	3729A SOUTH STREET	SH	U	A	3	N	L	48	B	5.20	G26-041A0046.jpg	G26-041I0047.jpg	32.35950	-88.71442	S		10
208	17	G26-041A	M	Y	3708 5TH ST.	YD	U	A	2	N	N	48	B	4.12	G26-041AA0010.jpg	G26-041AI0011.jpg	32.36000	-88.71445	S		0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
209	17	G26-041B	M	Y	3708 5TH ST.	TW	U	X		N	N	48	B	3.19	G26-041BA0005.jpg	G26-041BI0006.jpg	32.36008	-88.71420	S		0
210	17	G26-043	M	L	3513 3RD ST. (NORFORK SOUTHERN RR YARD)	OT	U								No Area Photo	No Internal Photo					
211	17	G26-043A	M	Y	3729 A SOUTH ST.	YD	U	A	45	N	N	48	B	13.32	G26-043AA0001.jpg	G26-043AI0002.jpg	32.35892	-88.71439	S		0
212	17	G26-044	M	Y	3800 2ND ST.	CR	U	A	2	N	L	60	C	6.73	G26-044A0012.jpg	G26-044I0013.jpg	32.35756	-88.71414	B		0
213	17	G26-045	M	Y	3729A SOUTH STREET	SH	U	A	1	N	L	48	B	5.41	G26-045A0001.jpg	G26-045I0002.jpg	32.35947	-88.71445	S		0
214	17	G26-046	M	Y	3701 5 STREET	SH	P	B	1	N	L	48	B	5.61	G26-046A0021.jpg	G26-046I0022.jpg	32.36061	-88.71411	V	36	0
215	17	G26-047	M	Y	302 34TH ST.	TW	U	A	26	N	N	48	C	10.52	G26-047A0001.jpg	G26-047I0002.jpg	32.35953	-88.71381	S		4
216	17	G26-049	M	Y	302 34TH ST	TW	U	A	12	N	N	48	C	5.28	G26-049A0006.jpg	G26-049I0007.jpg	32.35950	-88.71406	S		3
217	17	G26-052	M	Y	3511 3RD ST.	FD	U	A	4	N	L	60	C	17.63	G26-052A0001.jpg	G26-052I0002.jpg	32.35870	-88.71300	S		0
218	17	G26-172	M	Y	4021 4021 PAULDING ST	ST	P	X		N	L	48	B	6.60	G26-172A0049.jpg	G26-172I0050.jpg	32.36183	-88.71925	S	0	1
219	17	G26-173	M	Y	4016 5TH ST.	ST	P	B	0.5	N	L	36	B	6.21	G26-173A0021.jpg	G26-173I0022.jpg	32.36061	-88.71917	S		1
220	17	G26-174	M	Y	4018 RAILROAD ST	ST	P	X		N	L	48	B	5.52	G26-174A0033.jpg	G26-174I0034.jpg	32.35772	-88.71906	S		1
221	17	G26-176	M	Y	4012 RAILROAD ST	ST	P	B	1	N	L	48	B	5.98	G26-176A0027.jpg	G26-176I0028.jpg	32.35794	-88.71819	S		1
222	17	G26-177	M	Y	535 40TH AVE @ PAULDING ST.	ST	P	X	0	N	L	36	B	6.12	G26-177A0014.jpg	G26-177I0015.jpg	32.36175	-88.71814	V	36	0
223	17	G26-178	M	Y	3910 40 AVENUE	ST	P	X		N	L	48	B	5.10	G26-178A0044.jpg	G26-178I0045.jpg	32.36317	-88.71817	S		0
224	17	G26-179	M	Y	319 40 AVE	ST	P	B	1	N	M	48	B	8.20	G26-179A0047.jpg	G26-179I0048.jpg	32.35889	-88.71809	S		12
225	17	G26-180	M	Y	39 40 AVE	ST	P	X		N	L	48	B	6.68	G26-180A0021.jpg	G26-180I0022.jpg	32.35800	-88.71809	S		1
226	17	G26-181	M	Y	4007 5TH ST @ 40TH AVE.	ST	P	X		N	L	48	B	5.43	G26-181A0006.jpg	G26-181I0007.jpg	32.36061	-88.71814	S		0.5
227	17	G26-182	M	Y	312 40 AVE	ST	P	X		N	L	48	B	5.72	G26-182A0039.jpg	G26-182I0040.jpg	32.35836	-88.71809	S		0
228	17	G26-183	M	Y	416 40TH AVE.	ST	P	B	0.25	N	L	48	B	5.82	G26-183A0001.jpg	G26-183I0002.jpg	32.36011	-88.71811	S		0
229	17	G26-185	M	Y	320 40 AVE	ST	P	X		N	L	VLT	B	7.24	G26-185A0054.jpg	G26-185I0055.jpg	32.35886	-88.71797	S		2
230	17	G26-186	M	Y	400 40 AVE	ST	P	X		N	L	48	B	7.08	G26-186A0058.jpg	G26-186I0059.jpg	32.35944	-88.71800	S		1
231	17	G26-187	M	Y	3926 DAVIS STREET	ST	P	B	1	N	L	36	B	4.96	G26-187A0001.jpg	G26-187I0002.jpg	32.36228	-88.71797	S		3
232	17	G26-188	M	Y	535 40 AVE	ST	P	A	1	N	L	36	B	3.85	G26-188A0005.jpg	G26-188I0006.jpg	32.36172	-88.71780	S		4
233	17	G26-190	M	Y	614 39 AVE	ST	P	X	0	N	L	48	B	5.20	G26-190A0032.jpg	G26-190I0033.jpg	32.36289	-88.71731	V	36	0
234	17	G26-191	M	Y	602 39 AVE	ST	P	B	1	N	M	48	B	5.21	G26-191A0069.jpg	G26-191I0070.jpg	32.36230	-88.71722	V	36	0
235	17	G26-192	M	Y	3822 VALLEY STREET	ST	P	B	1	N	M	48	B	5.32	G26-192A0059.jpg	G26-192I0060.jpg	32.36319	-88.71689	S		6
236	17	G26-193	M	Y	405 AVE	ST	P	B	1	N	L	48	B	6.98	G26-193A0062.jpg	G26-193I0063.jpg	32.35947	-88.71675	S		0
237	17	G26-194	M	Y	100 39 AVE	ST	P	A	1	N	L	36	B	3.85	G26-194A0014.jpg	G26-194I0015.jpg	32.35833	-88.71675	S		2
238	17	G26-195	M	Y	425 39 AVE	ST	P	X		N	L	48	B	4.40	G26-195A0068.jpg	G26-195I0069.jpg	32.36044	-88.71677	S		2
239	17	G26-196	M	Y	3824 HOOPER ST	ST	P	X		N	L	48	B	4.47	G26-196A0001.jpg	G26-196I0002.jpg	32.35892	-88.71675	S		0
240	17	G26-197	M	Y	3822 DAVIS STREET	ST	U	B	1	N	M	48	B	4.60	G26-197A0061.jpg	G26-197I0062.jpg	32.36203	-88.71677	S		2
241	17	G26-198	M	Y	3822 DAVIS STREET	ST	P	B	1	N	M	48	B	4.96	G26-198A0057.jpg	G26-198I0058.jpg	32.36230	-88.71677	V	36	1
242	17	G26-199	M	Y	520 39 AVE	ST	P	B	1	N	L	48	B	4.35	G26-199A0010.jpg	G26-199I0011.jpg	32.36169	-88.71677	S		1
243	17	G26-200	M	Y	3822 DAVIS STREET	ST	P	X		N	L	48	B	4.35	G26-200A0052.jpg	G26-200I0053.jpg	32.36230	-88.71664	S		2
244	17	G26-201	M	Y	3817 PAULDING ST.	ST	P	A	0.5	N	L	48	B	3.73	G26-201A0012.jpg	G26-201I0013.jpg	32.36175	-88.71633	S		2
245	17	G26-203	M	Y	401 38 PLACE	ST	P	B	1	N	M	36	B	3.78	G26-203A0009.jpg	G26-203I0010.jpg	32.35892	-88.71600	S		1
246	17	G26-204	M	Y	3304 DAVIS STREET	ST	P	B	1	N	M	48	B	3.27	G26-204A0043.jpg	G26-204I0044.jpg	32.36225	-88.71545	S		1
247	17	G26-205	M	Y	610 38 AVE	ST	P	X		N	L	48	B	3.79	G26-205A0021.jpg	G26-205I0022.jpg	32.36272	-88.71575	S		0
248	17	G26-206	M	Y	3801 VALLEY STREET	ST	P	X		N	L	48	B	3.50	G26-206A0015.jpg	G26-206I0016.jpg	32.36317	-88.71575	V	36	0
249	17	G26-207	M	Y	519 38TH AVE.	ST	P	X		N	L	48	B	2.76	G26-207A0041.jpg	G26-207I0042.jpg	32.36203	-88.71542	S		1
250	17	G26-208	M	Y	3304 DAVIS STREET	ST	P	B	1	N	M	48	B	4.48	G26-208A0047.jpg	G26-208I0048.jpg	32.36225	-88.71575	V	36	0
251	17	G26-209	M	Y	3729 B SOUTH ST	ST	P	B	1	N	L	48	B	8.50	G26-209A0017.jpg	G26-209I0018.jpg	32.35947	-88.71539	V	1	0
252	17	G26-210	M	Y	517 38TH AVE @ PAULDING ST.	ST	P	X		N	L	48	B	3.00	G26-210A0035.jpg	G26-210I0036.jpg	32.36175	-88.71542	S		0
253	17	G26-211	M	Y	3803 5TH ST @ 38TH AVE.	ST	P	X		N	L	48	B	5.35	G26-211A0033.jpg	G26-211I0034.jpg	32.36064	-88.71542	V	36	0
254	17	G26-212	M	Y	508 38 AVENUE	ST	P	X		N	L	28	C	3.62	G26-212A0057.jpg	G26-212I0058.jpg	32.36119	-88.71542	S	0	1
255	17	G26-212A	M	Y	3801 SMITH ST.	YD	U	X		N	N	48	C	4.06	G26-212AA0014.jpg	G26-212AI0015.jpg	32.36117	-88.71581	S		0
256	17	G26-213	M	Y	515 38 AVENUE	ST	P	B	1	N	L	36	B	3.27	G26-213A0062.jpg	G26-213I0063.jpg	32.36139	-88.71542	S	0	1
257	17	G26-214	M	Y	419 38 AVENUE	ST	P	X		N	L	48	B	4.04	G26-214A0024.jpg	G26-214I0025.jpg	32.36025	-88.71536	S		5
258	17	G26-215	M	Y	3713 DAVIS STREET	ST	P	B	1	N	M	48	C	9.07	G26-215A0033.jpg	G26-215I0034.jpg	32.36230	-88.71545	S		1
259	17	G26-215A	E	N	3304 DAVIS STREET	YD	U							0.00	G26-215AA0041.jpg	No Internal Photo					
260	17	G26-215B	E	N	3713 DAVIS STREET	YD	U								G26-215BA0042.jpg	No Internal Photo					

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
261	17	G26-216	M	Y	309 38 AVE	ST	P	B	1	N	M	48	B	8.97	G26-216A0040.jpg	G26-216I0041.jpg	32.35864	-88.71542	S		5
262	17	G26-217	M	Y	3803 5TH ST @ 38TH AVE.	ST	P	X		N	L	48	C	10.29	G26-217A0026.jpg	G26-217I0027.jpg	32.36058	-88.71539	S		0
263	17	G26-218	M	Y	510 38TH AVE @ SMITH ST.	ST	P	X		N	L	48	C	8.98	G26-218A0069.jpg	G26-218I0070.jpg	32.36136	-88.71542	S		0
264	17	G26-219	M	Y	518 38TH AVE ON PAULDING ST.	ST	P	X		N	L	48	B	3.10	G26-219A0031.jpg	G26-219I0032.jpg	32.36172	-88.71519	S		0.5
265	17	G26-220	M	Y	3612 DAVIS ST. @ 37TH AVE.	ST	P	B	0.25	N	L	48	B	3.80	G26-220A0024.jpg	G26-220I0025.jpg	32.36230	-88.71455	S		0
266	17	G26-221	M	Y	606 37TH AVE.	ST	P	X		N	L	48	B	4.02	G26-221A0013.jpg	G26-221I0014.jpg	32.36267	-88.71455	S		0
267	17	G26-222	M	Y	611 37TH AVE	ST	P	X		N	L	48	B	4.38	G26-222A0007.jpg	G26-222I0008.jpg	32.36295	-88.71458	V	36	0
268	17	G26-223	M	Y	3706 DAVIS ST. @ 37TH AVE.	ST	P	X		N	L	48	C	7.27	G26-223A0001.jpg	G26-223I0002.jpg	32.36236	-88.71453	S		0
269	17	G26-224	M	Y	611 37TH AVE.	ST	P	X		N	L	48	B	7.48	G26-224A0020.jpg	G26-224I0021.jpg	32.36295	-88.71450	B		0
270	17	G26-225	M	Y	428 37 AVE	SH	U	B	1	N	M	48	C	8.74	G26-225A0027.jpg	G26-225I0028.jpg	32.36053	-88.71394	B		0
271	17	G26-226	M	Y	3605 DAVIS ST.	ST	P	X		N	L	48	B	5.18	G26-226A0005.jpg	G26-226I0006.jpg	32.36234	-88.71414	S		2
272	17	G26-227	M	Y	515 37 AVE	ST	P	A	1	N	L	48	B	5.60	G26-227A0034.jpg	G26-227I0035.jpg	32.36103	-88.71414	V	36	0
273	17	G26-228	M	Y	3701 5 STREET	ST	P	X		N	L	48	B	5.30	G26-228A0027.jpg	G26-228I0028.jpg	32.36067	-88.71416	S		0
274	17	G26-229	M	Y	3702 PAULDING ST @ 37TH AVE.	ST	P	A	0.5	N	L	48	B	3.62	G26-229A0024.jpg	G26-229I0025.jpg	32.36183	-88.71416	S		0
275	17	G26-231	M	Y	3422 RAY STREET	ST	P	A	1	N	L	48	B	5.44	G26-231A0021.jpg	G26-231I0022.jpg	32.36025	-88.71303	S		0
276	17	G26-232	M	Y	3400 DAVIS STREET	ST	P	X		N	L	48	B	5.01	G26-232A0064.jpg	G26-232I0065.jpg	32.36228	-88.71275	S		3
277	17	G26-233	M	Y	3405 5TH ST.	ST	P	X		N	L	48	B	5.85	G26-233A0016.jpg	G26-233I0017.jpg	32.36106	-88.71275	S		3
278	17	G26-234	M	Y	3400 5 STREET	ST	P	B	1	N	M	VLT	B	6.62	G26-234A0008.jpg	G26-234I0009.jpg	32.36106	-88.71252	V	36	0
279	17	G26-235	M	Y	519 34 AVE	ST	P	B	1	N	L	48	B	6.49	G26-235A0001.jpg	G26-235I0002.jpg	32.36169	-88.71255	S	0	0
280	17	G26-236	M	Y	300 34 AVE	ST	P	A	1	N	L	48	B	6.92	G26-236A0014.jpg	G26-236I0015.jpg	32.36028	-88.71252	S		2
281	17	G26-237	M	Y	302 34TH AVE. @ RAILROAD ST.	ST	P	X		N	L	48	B	6.89	G26-237A0039.jpg	G26-237I0040.jpg	32.35944	-88.71250	V	36	0
282	17	G26-238	M	Y	3330 DAVIS ST 2 34TH AVE.	ST	P	B	0.5	N	M	48	B	6.36	G26-238A0050.jpg	G26-238I0051.jpg	32.36228	-88.71255	V	32	0
283	17	G26-240	M	Y	401 33RD AVE ON RAILROAD ST.	ST	P	B	2	N	M	48	B	5.80	G26-240A0043.jpg	G26-240I0044.jpg	32.35981	-88.71122	S		3
284	17	G26-241	M	Y	3303 DAVIS ST.	ST	P	B	0.25	N	M	48	B	6.60	G26-241A0057.jpg	G26-241I0058.jpg	32.36234	-88.71122	V	36	15
285	17	G26-242	M	Y	406 33RD AVE @ 4TH ST.	ST	P	B	0.5	N	M	36	B	3.45	G26-242A0048.jpg	G26-242I0049.jpg	32.36014	-88.71103	S		3
286	17	G26-243	M	Y	3169 5TH ST. @ 33RD AVE.	ST	P	A	0.5	N	L	48	B	7.82	G26-243A0008.jpg	G26-243I0009.jpg	32.36103	-88.71091	S		0
287	17	G26-244	M	Y	526 33RD AVE @ DAVIS ST.	ST	P	B	0.25	N	L	48	B	8.61	G26-244A0001.jpg	G26-244I0002.jpg	32.36236	-88.71098	S		0
288	17	G26-245	M	Y	416 33RD AVE.	ST	P	X		N	L	48	B	5.45	G26-245A0001.jpg	G26-245I0002.jpg	32.36064	-88.71098	V	32	0
289	17	G26-256	E	N	619 VALLEY ST	ST	P								G26-256A0031.jpg	No Internal Photo					
290	17	G26-264	M	Y	101 36TH AVE @ 1ST ST.	ST	P	X		N	L	48	B	4.42	G26-264A0055.jpg	G26-264I0056.jpg	32.35669	-88.71358	S		0
291	17	G26-265	M	Y	116 36TH AVE. @ 2ND ST.	ST	P	X		N	L	48	C	5.92	G26-265A0017.jpg	G26-265I0018.jpg	32.35753	-88.71361	S		0
292	17	G26-266	M	Y	214 36TH AVE.	ST	P	X		N	L	48	B	5.52	G26-266A0022.jpg	G26-266I0023.jpg	32.35814	-88.71364	S		0
293	17	G26-267	M	Y	110 36TH AVE	ST	P	X		N	M	60	C	7.87	G26-267A0007.jpg	G26-267I0008.jpg	15.03917	-88.71361	S		0
294	17	G26-268	M	Y	116 36TH AVE.@ 2ND ST.	ST	P	A	0.25	N	L	60	C	10.41	G26-268A0033.jpg	G26-268I0034.jpg	32.35750	-88.71361	S		0
295	17	G26-269	M	Y	218 36TH AVE. @ 3RD ST.	ST	P	X		N	L	60	C	13.72	G26-269A0027.jpg	G26-269I0028.jpg	32.35831	-88.71358	S		0
296	17	G26-288	M	Y	116 36TH AVE. @ 2ND ST.	SH	U	X		N	M	36	B	4.76	G26-288A0040.jpg	G26-288I0041.jpg	32.35750	-88.71353	S		2
297	17	G26-288A	M	Y	3511 2ND ST.	SH	U	X		N	M	36	B	4.45	G26-288AA0049.jpg	G26-288AI0050.jpg	32.35750	-88.71325	S		0
298	17	G26-293	E	N	3108 4TH ST.	ST	P								G26-293A0053.jpg	No Internal Photo	32.36020	-88.71020			
299	17	G26-294	E	L	416 33RD AVE.	YD	U								G26-294A0007.jpg	No Internal Photo	32.36058	-88.71005			
300	17	G26-295	M	O	302 37TH ST.	FD	U	A	4						G26-295A0011.jpg	No Internal Photo	32.35950	-88.71320	B		
301	17	G26-298	M	Y	3701 5 STREET	YD	U	A	1	N	S	VLT	B	3.27	G26-298A0012.jpg	G26-298I0013.jpg	32.36020	-88.71423	S		0
302	17	G26-299	M	Y	3426 RAY STREET	SH	U	B	1	N	M	36	B	3.42	G26-299A0037.jpg	G26-299I0038.jpg	32.36025	-88.71386	S		2
303	17	G26-300	M	Y	3701 5 STREET	YD	U	A	5	N	L	48	C	8.71	G26-300A0007.jpg	G26-300I0008.jpg	32.36025	-88.71416	B		0
304	17	G26-301	M	Y	3426 RAY STREET	SH	U	A	3	N	L	48	C	9.20	G26-301A0031.jpg	G26-301I0032.jpg	32.36022	-88.71397	B		3
305	17	G27-025	E	N	1203 KORNAGY DR	ST	P								G27-025A0001.jpg	No Internal Photo					
306	17	G27-026	M	Y	3706 12 STREET	ST	P	X	0	N	L	48	B	5.24	G27-026A0014.jpg	G27-026I0015.jpg	32.36878	-88.71531	S		2
307	17	G27-027	M	Y	3705 7TH ST.	ST	P	B	0.25	N	L	36	B	3.90	G27-027A0029.jpg	G27-027I0030.jpg	32.36411	-88.71547	S		3
308	17	G27-030	M	Y	641 37TH AVE @ VALLEY ST.	SH	U	B	1	N	M	48	C	6.32	G27-030A0067.jpg	G27-030I0068.jpg	32.36350	-88.71378	B		0
309	17	G27-032	M	Y	641 36TH AVE @ VALLEY ST.	ST	P	X		N	L	48	B	3.86	G27-032A0061.jpg	G27-032I0062.jpg	32.36353	-88.71381	S		0
310	17	G27-033	M	S	3307 8TH ST.	ST	P	X		N	L	48	B	6.53	G27-033A0017.jpg	G27-033I0018.jpg	32.36494	-88.71144	S		3
311	17	G27-034	M	Y	1107 33RD AVE.	YD	U	X	0	N	L	36	B	2.25	G27-034A0026.jpg	G27-034I0027.jpg	32.36850	-88.71136	S		1
312	17	G27-035	M	Y	1013 33RD AVE.	SH	U	B	3	N	L	20	B	1.83	G27-035A0008.jpg	G27-035I0009.jpg	32.36744	-88.71133	S		4

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
313	17	G27-036	M	Y	3304 8TH ST @ 33RD AVE	ST	P	X		N	L	42	B	5.34	G27-036A0005.jpg	G27-036I0006.jpg	32.36489	-88.71111	S		0
314	17	G27-036A	M	Y	3304 8TH ST @ 33RD AVE.	ST	P	X		N	L	48X36	B	5.32	G27-036AA0011.jpg	G27-036AI0012.jpg	32.36492	-88.71111	S		0
315	17	G27-037	M	B	1004 32ND AVE.	ST	P	B	4						G27-037A0040.jpg	No Internal Photo	32.36711	-88.71044			
316	17	G27-038	M	Y	3113 VALLEY ST.	ST	P	X		N	L	48	B	3.76	G27-038A0020.jpg	G27-038I0021.jpg	32.36350	-88.71017	S		4
317	17	G27-098	M	Y	3918 8 STREET	ST	P	B	1	N	L	48	B	8.00	G27-098A0031.jpg	G27-098I0032.jpg	32.36492	-88.71819	S		4
318	17	G27-099	M	Y	3910 7 STREET	ST	P	X	0	N	L	48	B	6.08	G27-099A0038.jpg	G27-099I0039.jpg	32.36411	-88.71817	V	23	0
319	17	G27-106	M	Y	3910 7 STREET	ST	P	X	0	N	L	48	B	8.90	G27-106A0006.jpg	G27-106I0007.jpg	32.36406	-88.71728	S	0	10
320	17	G27-107	M	Y	628 39 AVE	ST	P	X	0	N	L	36	B	2.84	G27-107A0017.jpg	G27-107I0018.jpg	32.36350	-88.71722	S	0	1
321	17	G27-108	M	Y	628 39 AVE	ST	P	X	0	N	L	48	B	5.45	G27-108A0011.jpg	G27-108I0012.jpg	32.36378	-88.71722	S		0
322	17	G27-109	M	Y	619 39 AVE	ST	P	X	0	N	L	48	B	5.01	G27-109A0023.jpg	G27-109I0024.jpg	32.36319	-88.71719	S	0	0
323	17	G27-110	M	Y	701 39 AVE	ST	P	X	0	N	L	48	B	4.78	G27-110A0001.jpg	G27-110I0002.jpg	32.36428	-88.71694	S	0	6
324	17	G27-111	M	Y	3822 8 STREET	ST	P	X	0	N	L	48	B	13.44	G27-111A0022.jpg	G27-111I0023.jpg	32.36489	-88.71692	S	0	3
325	17	G27-112	M	Y	816 KORNEGAY DR	ST	P	X		N	L	48	B	7.85	G27-112A0026.jpg	G27-112I0027.jpg	32.36578	-88.71692	V	36	0
326	17	G27-112A	E	N	906 9 STREET	ST	P								G27-112AA0033.jpg	No Internal Photo					
327	17	G27-113	M	Y	918 KORNEGAY DR	ST	P	X	0	N	M	48	B	10.23	G27-113A0006.jpg	G27-113I0007.jpg	32.36681	-88.71694	V	36	0
328	17	G27-115	M	Y	1102 KORNEGAY DR	ST	P	X	0	N	L	48	B	4.18	G27-115A0002.jpg	G27-115I0003.jpg	32.36772	-88.71697	V	36	0
329	17	G27-116	M	Y	3814 7 STREET	ST	P	X		N	L	48	B	10.20	G27-116A0039.jpg	G27-116I0040.jpg	32.36411	-88.71684	S		6
330	17	G27-117	M	Y	3815 11 STREET	ST	P	X		N	L	48	B	4.25	G27-117A0053.jpg	G27-117I0054.jpg	32.36772	-88.71677	S	0	3
331	17	G27-118	M	Y	3819 12 STREET	ST	P	X	0	N	M	48	B	3.07	G27-118A0001.jpg	G27-118I0002.jpg	32.36880	-88.71664	V	36	1
332	17	G27-119	M	Y	3820 9 ST	ST	P	X	0	N	L	48	B	5.30	G27-119A0020.jpg	G27-119I0021.jpg	32.36578	-88.71655	S	0	0
333	17	G27-120	M	Y	3810 10 ST	ST	P	B	1	N	M	48	B	5.40	G27-120A0016.jpg	G27-120I0017.jpg	32.36675	-88.71631	S	0	10
334	17	G27-123	M	Y	3803 7 STREET	ST	P	B	1	N	L	48	B	5.76	G27-123A0033.jpg	G27-123I0034.jpg	32.36411	-88.71575	V	22	0
335	17	G27-124	M	Y	3752 8 STREET	ST	P	X	0	N	L	48	B	7.63	G27-124A0014.jpg	G27-124I0015.jpg	32.36489	-88.71572	S		0
336	17	G27-125	M	Y	818 38 AVE	ST	P	X		N	L	VLT	B	6.20	G27-125A0034.jpg	G27-125I0035.jpg	32.36578	-88.71575	S	0	0
337	17	G27-126	M	Y	929 38 AVE	ST	P	B	1	N	L	VLT	B	8.84	G27-126A0040.jpg	G27-126I0041.jpg	32.36678	-88.71575	S	0	0
338	17	G27-127	M	Y	1020 38 AVE	ST	P	X		N	L	VLT	B	5.87	G27-127A0045.jpg	G27-127I0046.jpg	32.36772	-88.71575	V	36	0
339	17	G27-128	M	Y	1121 38 AVE	ST	P	B	1	N	M	48	B	9.58	G27-128A0005.jpg	G27-128I0006.jpg	32.36878	-88.71575	S		1
340	17	G27-130	M	Y	3716 9 STREET	ST	P	X	0	N	L	48	B	6.11	G27-130A0001.jpg	G27-130I0002.jpg	32.36581	-88.71533	S	0	3
341	17	G27-131	M	Y	3715 11 STREET	ST	P	X	0	N	L	48	B	4.29	G27-131A0043.jpg	G27-131I0044.jpg	32.36775	-88.71533	S	0	0
342	17	G27-132	M	Y	3709 10 STREET	ST	P	B	1	N	L	48	B	4.80	G27-132A0058.jpg	G27-132I0059.jpg	32.36678	-88.71531	S	0	6
343	17	G27-133	M	Y	629 37TH AVE.	ST	P	B	0.25	N	L	48	B	4.74	G27-133A0001.jpg	G27-133I0002.jpg	32.36322	-88.71450	S		0
344	17	G27-134	M	Y	629 37TH AVE @ VALLEY ST.	ST	P	A	0.25	N	M	48	C	8.59	G27-134A0079.jpg	G27-134I0080.jpg	32.36347	-88.71453	B		0
345	17	G27-135	M	Y	3700 7TH ST @ 37TH AVE.	ST	P	X		N	L	48	B	6.37	G27-135A0023.jpg	G27-135I0024.jpg	32.36411	-88.71453	V	22	0
346	17	G27-136	M	Y	629 37TH AVE @ VALLEY ST.	ST	P	X		N	L	48	B	5.77	G27-136A0072.jpg	G27-136I0073.jpg	32.36350	-88.71455	S		0
347	17	G27-138	M	Y	821 37 AVE	ST	P	B	1	N	L	48	B	6.59	G27-138A0065.jpg	G27-138I0066.jpg	32.36578	-88.71450	S	0	0
348	17	G27-139	M	Y	923 37 AVE	ST	P	B	1	N	L	48	B	7.93	G27-139A0050.jpg	G27-139I0051.jpg	32.36683	-88.71455	S	0	0
349	17	G27-140	M	Y	3701 11 STREET	ST	P	X		N	L	48	B	6.53	G27-140A0034.jpg	G27-140I0035.jpg	32.36778	-88.71453	V	36	0
350	17	G27-141	M	Y	1117 37 AVE	ST	P	B	1	N	L	48	B	12.59	G27-141A0020.jpg	G27-141I0021.jpg	32.36880	-88.71450	V	36	0
351	17	G27-144	M	Y	640 37TH AVE ON 7TH ST.	ST	P	X		N	L	48	B	5.98	G27-144A0019.jpg	G27-144I0020.jpg	32.36411	-88.71433	S		8
352	17	G27-145	M	Y	3507 7TH ST @ 36TH AVE.	ST	P	X		N	L	48	B	5.81	G27-145A0012.jpg	G27-145I0013.jpg	32.36411	-88.71384	S		0
353	17	G27-145A	M	Y	704 36TH AVE.	ST	P	X		N	L	42X36	B	5.35	G27-145AA0001.jpg	G27-145AI0002.jpg	32.36442	-88.71381	S		0
354	17	G27-146	M	Y	3600 8 STREET	ST	P	X	0	N	L	48	B	6.88	G27-146A0001.jpg	G27-146I0002.jpg	32.36483	-88.71378	S	0	0
355	17	G27-147	M	Y	901 36 AVE	ST	P	B	1	N	L	48	B	7.75	G27-147A0005.jpg	G27-147I0006.jpg	32.36578	-88.71381	V	36	0
356	17	G27-148	M	Y	921 36 AVE	ST	P	B	1	N	M	48	B	9.62	G27-148A0084.jpg	G27-148I0085.jpg	32.36678	-88.71381	V	22	0
357	17	G27-149	M	Y	1023 36 AVE	ST	P	B	1	N	M	48	B	7.58	G27-149A0079.jpg	G27-149I0080.jpg	32.36772	-88.71381	V	22	0
358	17	G27-150	M	Y	3507 7TH ST @ 36TH AVE.	ST	P	A	0.25	N	L	48	C	8.53	G27-150A0008.jpg	G27-150I0009.jpg	32.36408	-88.71375	B		0
359	17	G27-151	M	Y	1120 36 AVE	ST	P	B	1	N	M	48	B	10.10	G27-151A0071.jpg	G27-151I0072.jpg	32.36880	-88.71381	V	22	0
360	17	G27-154	M	Y	3505 7 STREET	ST	P	B	1	N	M	48	C	7.33	G27-154A0039.jpg	G27-154I0040.jpg	32.36406	-88.71314	B		0
361	17	G27-156	M	Y	3505 8 STREET	ST	P	X		N	L	48	C	7.90	G27-156A0044.jpg	G27-156I0045.jpg	32.36475	-88.71306	S		0
362	17	G27-157	M	Y	925 35 AVE	ST	P	X	0	N	L	48	C	19.26	G27-157A0025.jpg	G27-157I0026.jpg	32.36678	-88.71314	S		0
363	17	G27-158	M	Y	3420 8TH ST ON 35TH AVE.	ST	P	X		N	L	48	C	8.18	G27-158A0034.jpg	G27-158I0035.jpg	32.36503	-88.71303	S		0
364	17	G27-159	M	Y	903 35 AVE	ST	P	B	1	N	M	48	C	13.93	G27-159A0048.jpg	G27-159I0049.jpg	32.36589	-88.71306	S	0	0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
365	17	G27-160	M	Y	3420 8TH ST @ 36TH AVE.	ST	P	X		N	L	48	B	5.45	G27-160A0038.jpg	G27-160I0039.jpg	32.36492	-88.71303	S		0
366	17	G27-161	M	Y	3420 8TH ST @ 35TH AVE.	ST	P	B	0.25	N	L	48	B	5.28	G27-161A0027.jpg	G27-161I0028.jpg	32.36494	-88.71306	S		0
367	17	G27-161A	M	Y	3325 8TH ST @ 35TH AVE.	ST	P	X		N	L	48	C	6.60	G27-161AA0022.jpg	G27-161AI0023.jpg	32.36494	-88.71252	S		0
368	17	G27-162	M	Y	903 35 AVE	ST	P	X	0	N	L	48	B	10.29	G27-162A0039.jpg	G27-162I0040.jpg	32.36578	-88.71303	S	0	0
369	17	G27-162A	E	N	3522 9 STREET	ST	P								G27-162AA0047.jpg	No Internal Photo					
370	17	G27-163	M	Y	925 35 AVE	ST	P	B	1	N	L	48	B	17.66	G27-163A0031.jpg	G27-163I0032.jpg	32.36681	-88.71303	S	0	1
371	17	G27-164	M	Y	1118 35 AVE	ST	P	X		N	L	48	B	6.15	G27-164A0010.jpg	G27-164I0011.jpg	32.36861		S	0	1
372	17	G27-165	M	Y	1021 35 AVE	ST	P	B	1	N	M	48	B	8.66	G27-165A0019.jpg	G27-165I0020.jpg	32.36775	-88.71306	S		1
373	17	G27-171	M	Y	3403 11 STREET	ST	P	X		N	M	36	B	4.66	G27-171A0001.jpg	G27-171I0002.jpg	32.36778	-88.71259	V	36	2
374	17	G27-171A	E	N	3414 11 STREET	ST	P								G27-171AA0006.jpg	No Internal Photo					
375	17	G27-172	M	Y	620 34TH AVE.	ST	P	B	0.25	N	M	48	B	5.40	G27-172A0046.jpg	G27-172I0047.jpg	32.36333	-88.71252	V	36	3
376	17	G27-173	M	Y	742 34TH AVE.	ST	P	B	0.5	N	M	48	B	5.92	G27-173A0041.jpg	G27-173I0042.jpg	32.36367	-88.71252	S		1
377	17	G27-174	M	Y	3501 7 STREET	ST	P	X		N	L	48	B	6.02	G27-174A0008.jpg	G27-174I0009.jpg	32.36411	-88.71250	V	24	0
378	17	G27-175	M	Y	3331 7 STREET	ST	P	B	1	N	M	48	B	6.20	G27-175A0015.jpg	G27-175I0016.jpg	32.36408	-88.71230	S		0
379	17	G27-175A	M	Y	3329 7 STREET	YD	U	A	5	N	L	48	C	2.58	G27-175AA0020.jpg	G27-175AI0021.jpg	32.36400	-88.71233	S		0
380	17	G27-175B	M	Y	3313 7 STREET	YD	U	A	3	N	L	48	C	2.38	G27-175BA0027.jpg	G27-175BI0028.jpg	32.36400	-88.71178	S		0
381	17	G27-176	M	Y	3330 VALLEY ST.	ST	P	X		N	L	42	B	3.84	G27-176A0013.jpg	No Internal Photo	32.36350	-88.71230	S		1
382	17	G27-177	M	Y	1101 34 AVE	ST	P	X		N	L	48	C	10.32	G27-177A0016.jpg	G27-177I0017.jpg	32.36783	-88.71222	S		0
383	17	G27-178	M	Y	1001 10 STREET	ST	P	X		N	L	48	C	8.20	G27-178A0027.jpg	G27-178I0028.jpg	32.36678	-88.71220	S		0
384	17	G27-181	M	Y	1001 10 STREET	ST	P	B	1	N	M	48	B	6.41	G27-181A0021.jpg	G27-181I0022.jpg	32.36681	-88.71220	V	36	0
385	17	G27-182	M	Y	1101 34 AVE	ST	P	B	1	N	M	48	B	7.86	G27-182A0007.jpg	G27-182I0008.jpg	32.36781	-88.71217	V	36	0
386	17	G27-185	M	Y	3313 VALLEY ST.	ST	P	X		N	L	48	B	5.34	G27-185A0017.jpg	G27-185I0018.jpg	32.36350	-88.71175	S		0.5
387	17	G27-185A	M	Y	3314 VALLEY ST.	YD	U	A	3	N	N	48	C	4.37	G27-185AA0023.jpg	G27-185AI0024.jpg	32.36358	-88.71172	S		0
388	17	G27-185B	M	Y	3332 VALLEY ST.	YD	U	A	2	N	L	24	C	1.53	G27-185BA0030.jpg	G27-185BI0031.jpg	32.36361	-88.71230	S		0
389	17	G27-187	M	Y	3210 10 STREET	ST	P	A	1	N	L	37	B	3.37	G27-187A0032.jpg	G27-187I0033.jpg	32.36683	-88.71144	S		0
390	17	G27-188	M	Y	3309 7 STREET	ST	P	X		N	L	48	B	4.62	G27-188A0033.jpg	G27-188I0034.jpg	32.36408	-88.71133	V	21	6
391	17	G27-189	M	Y	1021 33RD AVE. @ 11TH ST.	SH	U	A	4	N	L	36	B	3.97	G27-189A0001.jpg	G27-189I0002.jpg	32.36769	-88.71139	S		4
392	17	G27-191	M	Y	3210 10 STREET	ST	P	X		N	L	36	B	4.42	G27-191A0038.jpg	G27-191I0039.jpg	32.36683	-88.71133	S		2
393	17	G27-193	M	Y	3212 11TH ST. @ 33RD AVE.	ST	P	B	0.5	N	M	48	B	5.11	G27-193A0014.jpg	G27-193I0015.jpg	32.36781	-86.71133	S		0
394	17	G27-193A	M	Y	3214 11TH ST. @ 33RD AVE.	SH	U	A	3	N	L	36	B	3.52	G27-193AA0021.jpg	G27-193AI0022.jpg	32.36783	-88.71130	S		1
395	17	G27-195	M	Y	701 33 AVENUE	ST	P	B	1	N	M	36	B	2.85	G27-195A0052.jpg	G27-195I0053.jpg	32.36411	-88.71105	S		0
396	17	G27-196	M	Y	3124 VALLEY ST @ 33RD AVE.	ST	P	A	0.5	N	M	40	B	3.47	G27-196A0033.jpg	G27-196I0034.jpg	32.36350	-88.71098	V	36	0
397	17	G27-198	M	Y	3110 7 STREET	ST	P	X		N	L	36	B	3.40	G27-198A0049.jpg	G27-198I0050.jpg	32.36408	-88.70983	V	36	2
398	17	G27-200	M	Y	3505 7TH ST @ 35 AVE.	ST	P	X		N	M	48	B	4.26	G27-200A0001.jpg	G27-200I0002.jpg	8.76417	-88.71311	V	36	0
399	17	G27-205	E	N	3416 11 STREET	ST	P								G27-205A0024.jpg	No Internal Photo					
400	17	G27-206	E	N	3819 10 STREET	ST	P								G27-206A0030.jpg	No Internal Photo					
401	17	G27-207	M	Y	1013 33RD ST.	SH	U	X		N	N	48	B	1.46	G27-207A0018.jpg	G27-207I0019.jpg	32.36711	-88.71133	S		0
402	17	G27-208	E	N	3910 40 AVE	ST	P								G27-208A0037.jpg	No Internal Photo					
403	17	G27-266	M	Y	3615 8 STREET	ST	P	X	0	N	L	48	B	6.67	G27-266A0008.jpg	G27-266I0009.jpg	32.36483	-88.71461	S	0	0
404	17	G27-267	M	Y	3115 11TH ST. @ 32ND AVE.	ST	P	X		N	L	48	B	5.45	G27-267A0031.jpg	G27-267I0032.jpg	32.36778	-88.71044	S		3
405	17	G27-269	M	B	1113 32ND AVE.	ST	P	B	3						G27-269A0030.jpg	No Internal Photo	32.36869	-88.71044			
406	17	G27-278	E	N	3752 8 STREET	ST	P								G27-278A0021.jpg	No Internal Photo					
407	17	H26-001	M	Y	3111 DAVIS ST.	ST	P	B	0.25	N	M	48	B	5.40	H26-001A0007.jpg	H26-001I0008.jpg	32.36236	-88.70989	S		0
408	17	H27-002	M	Y	1111 30TH AVE.	ST	P	B	0.25	N	M	48	B	6.20	H27-002A0035.jpg	H27-002I0036.jpg	32.36831	-88.70872	S		0
409	17	H27-007	M	Y	2915 12TH ST.	ST	P	B	0.25	N	M	48	B	4.58	H27-007A0054.jpg	H27-007I0055.jpg	32.36892	-88.70814	S		1
410	17	H27-051	M	Y	3105 8TH ST. (WENDYS)	ST	P	X		N	L	48	B	5.52	H27-051A0001.jpg	H27-051I0002.jpg	32.36489	-88.70983	V	22	6
411	17	H27-052	M	Y	3100 10 STREET	ST	P	B	1	N	M	36	B	6.85	H27-052A0044.jpg	H27-052I0045.jpg	32.36681	-88.70975	S		0
412	17	H27-092	M	Y	3012 10 STREET	ST	P	B	1	N	M	48	B	5.72	H27-092A0052.jpg	H27-092I0053.jpg	32.36681	-88.70934	S		1
413	17	H27-217	M	Y	1008 ML KING JR DR.	ST	P	X		N	L	42	B	3.68	H27-217A0001.jpg	H27-217I0002.jpg	32.36728	-88.70959	S		2
414	17	H27-218	M	Y	3017 11TH ST. @ ML KINK JR DR.	ST	P	X		N	L	48	B	9.72	H27-218A0004.jpg	H27-218I0005.jpg	32.36781	-88.70964	S		0
415	17	H27-219	M	Y	1110 M L KING JR DR.	ST	P	A	0.25	N	L	48	B	4.88	H27-219A0015.jpg	H27-219I0016.jpg	32.36828	-88.70959	S		0.5
416	17	H27-222	M	Y	1101 30TH AVE.	ST	P	B	0.25	N	M	36	B	4.93	H27-222A0030.jpg	H27-222I0031.jpg	32.36808	-88.70872	S		2

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
417	17	H27-223	M	Y	1100 30TH AVE @ 11TH ST.	ST	P	B	0.25	N	M	48	B	15.83	H27-223A0061.jpg	H27-223I0062.jpg	32.36786	-88.70875	S		1
418	17	H27-225	M	Y	1114 30TH AVE.	ST	P	X		N	L	36	B	4.91	H27-225A0045.jpg	H27-225I0046.jpg	32.36850	-88.70872	S		0
419	17	H27-228	M	Y	1116 M L KING JR DR.	ST	P	X		N	L	48	B	3.61	H27-228A0021.jpg	H27-228I0022.jpg	32.36869	-88.70966	S		0.5
420	17	H27-234	M	Y	3101 12TH ST @ M L KING JR DR.	ST	P	B	0.25	N	L	48	B	6.29	H27-234A0026.jpg	H27-234I0027.jpg	32.36889	-88.70961	S		0
421	30	H31-026	M	L	No # N. PINE ST	ST	P								No Area Photo	No Internal Photo					
422	30	H31-165	M	Y	1603 NORTHWOOD DR	ST	P	X		N	N	48	B	5.60	H31-165A0014.jpg	H31-165I0015.jpg	32.39706	-88.69522	S		0
423	30	H31-165A	M	B	1603 NORTHWOOD DR	ST	P	B	6	N	N				H31-165AA0019.jpg	No Internal Photo	32.39695	-88.69556			
424	30	H31-166	M	Y	1520 NORTHWOOD DR	ST	P	X		N	N	48	B	5.40	H31-166A0020.jpg	H31-166I0021.jpg	32.39745	-88.69439	S		0
425	30	H31-167	M	Y	1512 N. PINE ST	ST	P	X		N	N	48	B	6.16	H31-167A0008.jpg	H31-167I0009.jpg	32.39689	-88.69395	S		0
426	30	H31-168	M	Y	3816 OAKDALE AVE	ST	P	X		N	N	48	B	8.90	H31-168A0054.jpg	H31-168I0055.jpg	32.39772	-88.69380	S		0
427	30	H31-169	M	Y	1501 N. PINE ST	ST	P	X		N	N	48	B	9.38	H31-169A0001.jpg	H31-169I0002.jpg	32.39711	-88.69328	S		0
428	30	H31-170	M	Y	1736 COUNTRY CLUB DR	ST	P	X		N	N	48	B	5.64	H31-170A0027.jpg	H31-170I0028.jpg	32.39817	-88.69617	S		2
429	30	H31-171	M	Y	1735 COUNTRY CLUB DR	ST	P	X		N	N	48	B	6.52	H31-171A0031.jpg	H31-171I0032.jpg	32.39853	-88.69542	S		0
430	30	H31-172	M	Y	1520 COUNTRY CLUB DR	ST	P	X		N	N	48	B	14.60	H31-172A0035.jpg	H31-172I0036.jpg	32.39919	-88.69458	S		0
431	30	H31-174	M	Y	3833 OAKDALE AVE	ST	P	X		N	N	48	B	7.28	H31-174A0045.jpg	H31-174I0046.jpg	32.39839	-88.69389	S		5
432	30	H31-175	M	Y	3816 OAKDALE AVE	ST	P	X		N	N	48	B	8.58	H31-175A0050.jpg	H31-175I0051.jpg	32.39769	-88.69383	S		0
433	30	H31-176	M	Y	1639 COUNTRY CLUB DR	ST	P	X		N	L	48	B	10.94	H31-176A0040.jpg	H31-176I0041.jpg	32.39925	-88.69444	S		0
434	30	H31-177	M	Y	3892 COUNTRY CLUB DR	YD	U	X		N	N	48	SB	8.48	H31-177A0039.jpg	H31-177I0040.jpg	32.39931	-88.69325	S		0
435	30	H31-178	M	Y	3900 COUNTRY CLUB DR	FD	U	A	8	N	N	48	C	10.04	H31-178A0042.jpg	H31-178I0043.jpg	32.39847	-88.69319	S		0
436	30	H31-179	M	Y	3900 COUNTRY CLUB DR	YD	U	A	1	N	N	48	C	8.67	H31-179A0038.jpg	H31-179I0039.jpg	32.39869	-88.69278	S		0
437	30	H31-180	M	Y	3900 COUNTRY CLUB DR	YD	U	A	4	N	N	48	C	11.06	H31-180A0046.jpg	H31-180I0047.jpg	32.39286	-88.69275	S		0
438	30	H32-077	M	Y	2100 VALLEY VIEW DR	ST	P	X		N	N	48	B	7.96	H32-077A0013.jpg	H32-077I0014.jpg	32.40350	-88.69852	S		2
439	30	H32-078	M	L	No # VALLEY VIEW DR	YD	U								No Area Photo	No Internal Photo					
440	30	H32-079	M	Y	1820 43RD ST	ST	P	X		N	L	48	B	6.20	H32-079A0001.jpg	H32-079I0002.jpg	32.40275	-88.69836	S		1
441	30	H32-080	M	Y	4314 21ST ST	ST	P	X		N	L	48	B	5.48	H32-080A0020.jpg	H32-080I0021.jpg	32.40331	-88.69850	S		2
442	30	H32-082	M	L	No # VALLEY VIEW DR	ST	P								No Area Photo	No Internal Photo					
443	30	H32-085	M	Y	2018 43RD ST	ST	P	X		N	L	48	B	6.10	H32-085A0007.jpg	H32-085I0008.jpg	32.40275	-88.69789	S		0
444	30	H32-088	M	Y	2006 VALLY VIEW DR	ST	P	X		N	N	48	B	7.18	H32-088A0006.jpg	H32-088I0007.jpg	32.40358	-88.69791	S		2
445	30	H32-089	M	Y	1735 PINEVIEW CIRCLE	ST	P	X		N	L	48	B	4.70	H32-089A0067.jpg	H32-089I0068.jpg	32.40067	-88.69772	S		3
446	30	H32-091	M	Y	4325 20TH AVE	ST	P	X		N	L	48	B	6.18	H32-091A0001.jpg	H32-091I0002.jpg	32.40342	-88.69744	S		0
447	30	H32-092	M	Y	1801 43RD ST	ST	P	X		N	L	48	B	6.54	H32-092A0012.jpg	H32-092I0013.jpg	32.40278	-88.69736	S		0
448	30	H32-093	M	Y	1725 PINEVIEW CIRCLE	ST	P	X		N	L	48	B	5.46	H32-093A0001.jpg	H32-093I0002.jpg	32.40086	-88.69744	S		0
449	30	H32-094	M	Y	1725 PINEVIEW CIRCLE	ST	P	X		N	L	48	B	5.58	H32-094A0061.jpg	H32-094I0062.jpg	32.40089	-88.69728	S		4
450	30	H32-095	M	Y	1722 PINEVIEW CIRCLE	YD	U	X		N	N	48	B	5.42	H32-095A0005.jpg	H32-095I0006.jpg	32.40150	-88.69700	S		0
451	30	H32-097	M	Y	4341 18TH AVE	ST	P	X		N	L	48	B	5.86	H32-097A0001.jpg	H32-097I0002.jpg	32.40400	-88.69678	S		0
452	30	H32-099	M	Y	4343 18TH AVE	ST	P	X		N	L	48	B	7.26	H32-099A0010.jpg	H32-099I0011.jpg	32.40445	-88.69675	S		0
453	30	H32-099A	M	Y	4343 18TH AVE	SH	U	X		N	N	48	B	5.58	H32-099AA0016.jpg	H32-099AI0017.jpg	32.40447	-88.69681	S		0
454	30	H32-099B	E	N	4352 18TH AVE	SH	U								H32-099BA0032.jpg	No Internal Photo	32.40478	-88.69681			
455	30	H32-101	M	Y	4420 18TH AVE	ST	P	X		N	L	48	B	7.08	H32-101A0021.jpg	H32-101I0022.jpg	32.40508	-88.69675	S		0
456	30	H32-101A	M	Y	4502 18TH AVE	ST	P	X		N	L	48	B	14.80	H32-101AA0027.jpg	H32-101AI0028.jpg	32.40561	-88.69672	S		6
457	30	H32-102	M	Y	1721 PINEVIEW CIRCLE	YD	U	X		N	L	48	B	3.70	H32-102A0010.jpg	H32-102I0011.jpg	32.41750	-88.69661	S		0
458	30	H32-103	M	Y	1715 43RD ST	ST	P	X		N	L	48	B	6.98	H32-103A0018.jpg	H32-103I0019.jpg	32.40281	-88.69653	S		0
459	30	H32-104	M	Y	4341 18TH AVE	YD	U	X		N	M	48	B	5.26	H32-104A0033.jpg	H32-104I0034.jpg	32.40361	-88.69622	S		0
460	30	H32-105	M	Y	4341 18TH AVE	TW	U	A	1	N	L	48	SB	4.26	H32-104A0015.jpg	H32-104I0016.jpg	32.40386	-88.69644	S		0
461	30	H32-106	M	L	No # PINEVIEW	ST	P								No Area Photo	No Internal Photo					
462	30	H32-107	M	L	No # 18TH AVE	YD	U								No Area Photo	No Internal Photo					
463	30	H32-108	M	Y	1613 43RD ST	ST	P	X		N	L	48	B	6.42	H32-108A0023.jpg	H32-108I0024.jpg	32.40278	-88.69589	S		0
464	30	H32-109	M	Y	4201 PINEVIEW CIRCLE	SH	U	X		N	N	48	B	6.12	H32-109A0015.jpg	H32-109I0016.jpg	32.40178	-88.69589	S		3
465	30	H32-112	M	Y	1607 43RD ST	ST	P	X		N	N	48	B	5.86	H32-112A0029.jpg	H32-112I0030.jpg	32.40275	-88.69514	S		0
466	30	H32-113	M	Y	4118 PINEVIEW CIRCLE	SH	U	X		N	S	48	B	3.42	H32-113A0023.jpg	H32-113I0024.jpg	32.40139	-88.69534	S		2
467	30	H32-116	M	Y	4216 CLUB VIEW DR	SH	U	X		N	N	48	B	4.02	H32-116A0041.jpg	No Internal Photo	32.40217	-88.69481	S		0
468	30	H32-118	M	L	No # CLUB PARK DR	ST	P								No Area Photo	No Internal Photo					

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
469	30	H32-122	M	Y	4216 CLUB VIEW DR	ST	P	X		N	L	48	C	7.72	H32-122A0045.jpg	H32-122I0046.jpg	32.40217	-88.69481	S		0
470	30	H32-123	M	L	No # 43RD ST	ST	P								No Area Photo	No Internal Photo					
471	30	H32-124	M	Y	1507 43RD ST	DD	U	B	6	N	M	48	B	5.64	H32-124A0059.jpg	H32-124I0060.jpg	32.40278	-88.69466	S		4
472	30	H32-125	M	Y	1607 43RD ST	ST	P	X		Y	L	48	B	6.07	H32-125A0035.jpg	H32-125I0036.jpg	32.40272	-88.69486	S		0
473	30	H32-126	M	B	1507 43RD ST	YD	U	B	7						No Area Photo	No Internal Photo	32.40278	-88.69447			
474	30	H32-127	M	Y	4206 CLIB VIEW DR	SH	U	X		N	L	48	C	5.29	H32-127A0049.jpg	H32-127I0050.jpg	32.40178	-88.69466	S		0
475	30	H32-131	M	Y	4206 CLUB VIEW DR	YD	U	X		N	N	48	C	8.64	H32-131A0055.jpg	H32-131I0056.jpg	32.40181	-88.69464	S		0
476	30	H32-138	M	Y	3907 COUNTRY CLUB ROAD	YD	U	X		N	L	48	B	3.98	No Area Photo	No Internal Photo	32.40100	-88.69442	S		3
477	30	H32-140	M	L	No # PINEVIEW CIRCLE	TW	U								No Area Photo	No Internal Photo					
478	30	H32-142	M	Y	3907 COUNTRY CLUB ROAD	YD	U	A	30	N	N	48	C	8.71	H32-142A0022.jpg	H32-142I0023.jpg	32.40097	-88.69431	S		0
479	30	H32-144	M	L	No # COUNTRY CLUB ROAD	TW	U								No Area Photo	No Internal Photo					
480	30	H32-145	M	Y	3907 COUNTRY CLUB ROAD	TW	U	A	28	N	L	48	C	10.06	H32-145A0011.jpg	H32-145I0012.jpg	32.40050	-88.69422	S		0
481	30	H32-149	M	Y	1505 43RD ST	ST	P	X		N	M	48	B	5.98	H32-149A0065.jpg	H32-149I0066.jpg	32.40272	-88.69395	S		0
482	30	H32-153	M	Y	3906 COUNTRY CLUB DR	ST	P	X		N	L	48	B	6.84	H32-153A0041.jpg	H32-153I0042.jpg	32.40014	-88.69347	S		6
483	30	H32-154	M	Y	3903 COUNTRY CLUB DR	ST	P	X		N	N	48	SB	5.86	H32-154A0045.jpg	H32-154I0046.jpg	32.40055	-88.69334	S		0
484	30	H32-155	M	Y	4150 COUNTRY CLUB DR	ST	P	X		N	M	48	B	5.40	H32-155A0050.jpg	H32-155I0051.jpg	32.40155	-88.69328	S		0
485	30	H32-155A	M	Y	3859 COUNTRY CLUB DR	ST	P	X		N	L	48	B	5.88	H32-155AA0055.jpg	H32-155AI0056.jpg	32.40253	-88.69319	S		0
486	30	H32-164	M	Y	3900 COUNTRY CLUB DR	ST	P	X		N	N	48	B	7.17	H32-164A0031.jpg	H32-164I0032.jpg	32.39842	-88.69395	S		0
487	30	H32-165	M	Y	3900 COUNTRY CLUB DR	YD	U	A	4	N	L	48	SB	9.76	H32-165A0036.jpg	H32-165I0037.jpg	32.39978	-88.69389	S		0
488	30	H32-166	M	L	No # COUNTRY CLUB ROAD	TW	U								No Area Photo	No Internal Photo					
489	30	I29-053	M	Y	2325 OLD MARION RD	ST	P	X		N	N	48	B	6.64	No Area Photo	No Internal Photo	32.38275	-88.67934	S		1
490	30	I29-060	M	L	No # 6TH AVE	ST	P								No Area Photo	No Internal Photo					
491	30	I29-064	M	L	? 6TH AVE	ST	P								No Area Photo	No Internal Photo					
492	30	I29-065	M	Y	2330 HWY 39 N. (MH LOCATED ON 24TH ST)	ST	P	X		N	M	48	B	4.72	I29-065A0078.jpg	I29-065I0079.jpg	32.38283	-88.68314	S		3
493	30	I29-066	M	Y	2302 HWY 39 N.	SH	U	A	44	N	N	60	C	7.26	I29-066A0070.jpg	I29-066I0071.jpg	32.38203	-88.68272	S		3
494	30	I29-067	M	L	2302 HWY 39 N.	YD	U								No Area Photo	No Internal Photo					0
495	30	I29-068	M	L	No # HWY 39 N.	ST	P								No Area Photo	No Internal Photo					
496	30	I29-075	M	Y	7325 OLD MARION RD	ST	P	X		N	L	48	C	7.16	I29-075A0018.jpg	I29-075I0019.jpg	32.38278	-88.67939	S		0
497	30	I29-082	M	Y	214 24TH ST	ST	P	X		N	L	48	B	4.70	I29-082A0020.jpg	I29-082I0021.jpg	32.38280	-88.68256	S		3
498	30	I29-082A	M	Y	214 24TH ST	ST	P	X		N	L	48	B	4.32	I29-082AA0026.jpg	I29-082AI0027.jpg	32.38295	-88.68261	S		0
499	30	I29-083	M	Y	2420 4TH AVE	ST	P	X		N	L	48	B	6.80	I29-083A0031.jpg	I29-083I0032.jpg	32.38334	-88.68264	S		3
500	30	I29-084	M	Y	2420 4TH AVE	ST	P	X		N	L	48	B	6.32	I29-084A0036.jpg	I29-084I0037.jpg	32.38378	-88.68261	S		4
501	30	I29-085	M	Y	2420 4TH AVE	ST	P	X		N	L	48	B	8.64	I29-085A0042.jpg	I29-085I0043.jpg	32.38419	-88.68259	S		0
502	30	I29-086	M	Y	2420 4TH AVE	ST	P	X		N	L	48	B	9.42	I29-086A0047.jpg	I29-086I0048.jpg	32.38475	-88.68261	S		3
503	30	I29-087	M	Y	2416 3RD AVE	ST	P	X		N	L	48	B	6.50	I29-087A0067.jpg	I29-087I0068.jpg	32.38342	-88.68172	S		2
504	30	I29-088	M	Y	2418 3RD AVE	YD	U	B	1	N	M	48	B	6.58	I29-088A0072.jpg	I29-088I0073.jpg	32.38342	-88.68175	S		2
505	30	I29-089	M	Y	2428 3RD AVE	SH	U	X		N	L	48	SB	5.66	I29-089A0080.jpg	I29-089I0081.jpg	32.38403	-88.68172	S		0
506	30	I29-090	M	Y	2940 3RD AVE	SH	U	X		N	N	48	B	8.09	I29-090A0055.jpg	I29-090I0056.jpg	32.38458	-88.68172	S		0
507	30	I29-145	M	Y	214 24TH ST	ST	P	X		N	L	48	B	7.10	I29-145A0059.jpg	I29-145I0060.jpg	32.38283	-88.68175	S		2
508	30	I29-146	M	Y	2313 3RD AVE	ST	P	X		N	L	48	B	3.18	I29-146A0006.jpg	I29-146I0007.jpg	32.38203	-88.68178	S		6
509	30	I29-147	M	Y	2430 2ND AVE	DW	U	X		N	N	48	B	4.48	I29-147A0022.jpg	I29-147I0023.jpg	32.38375	-88.68089	S		0
510	30	I29-148	M	Y	128 24TH ST	ST	P	X		N	L	48	B	6.50	I29-148A0014.jpg	I29-148I0015.jpg	32.38286	-88.68086	S		0
511	30	I29-149	M	Y	2304 2ND AVE	ST	P	X		N	L	48	B	2.42	I29-149A0011.jpg	I29-149I0012.jpg	32.38192	-88.68092	S		6
512	30	I29-150	M	Y	105 24TH ST	ST	P	X		N	L	48	B	8.80	I29-150A0030.jpg	I29-150I0031.jpg	32.38283	-88.67989	S		0
513	30	I29-151	M	Y	2429 OLD MARION RD	ST	P	X		N	M	48	SB	5.56	I29-151A0048.jpg	I29-151I0049.jpg	32.38467	-88.67970	V	4	0
514	30	I29-152	M	Y	3415 OLD MARION RD	ST	P	X		N	M	48	C	6.21	I29-152A0043.jpg	I29-152I0044.jpg	32.38386	-88.67964	V	4	0
515	30	I29-153	M	Y	2325 OLD MARION RD	ST	P	X		N	L	48	B	6.64	I29-153A0035.jpg	I29-153I0036.jpg	32.38275	-88.67934	S		1
516	30	I29-154	M	Y	2430 2ND AVE.	TW	U	A	15	N	L	48	SB	4.98	I29-154A0001.jpg	I29-154I0002.jpg	32.38369	-88.68022	S		0
517	30	I29-155	M	Y	2330 HWY 39N.	SH	U	A	19	N	N	48	B	4.46	I29-155A0024.jpg	I29-155I0025.jpg	32.38139	-88.68195	S		0
518	30	I29-156	M	Y	2313 3RD ST	FD	U	A	1	N	N	48	C	8.46	I29-156A0023.jpg	I29-156I0024.jpg	32.38172	-88.68178	S		0
519	30	I29-159	M	Y	2304 2ND AVE	TW	U	A	35	N	N	48	C	16.72	I29-159A0028.jpg	I29-159I0029.jpg	32.38186	-88.68086	S		0
520	30	I29-162	M	Y	2307 OLD MARION HWY	SH	U	A	2	N	S	48	C	14.68	I29-162A0033.jpg	I29-162I0034.jpg	32.38167	-88.68005	S		0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
521	30	I29-163	M	B	2307 OLD MARION RD	ST	P								I29-163A0023.jpg	No Internal Photo	32.38172	-88.67989			
522	30	I29-176	M	Y	807 26TH ST	ST	P	X		N	L	48	B	6.84	I29-176A0061.jpg	I29-176I0062.jpg	33.38461	-88.68781	S		2
523	30	I29-177	M	Y	807 26TH ST	ST	P	X		N	L	48	B	6.93	I29-177A0067.jpg	I29-177I0068.jpg	32.38461	-88.68767	S		0
524	30	I29-178	M	Y	803 26TH ST	ST	P	X		N	L	48	B	6.41	I29-178A0071.jpg	I29-178I0072.jpg	32.38422	-88.68686	S		0
525	30	I29-178A	M	L	2507 HWY 39 N.	ST	P								No Area Photo	No Internal Photo					0
526	30	I29-179	M	Y	720 26TH ST	ST	P	X		N	L	48	C	6.80	I29-179A0001.jpg	I29-179I0002.jpg	32.38408	-88.68655	S		0
527	30	I29-180	M	Y	703 26TH ST	ST	P	X		N	L	48	B	6.54	I29-180A0005.jpg	I29-180I0006.jpg	32.38364	-88.68561	S		0
528	30	I29-181	M	Y	703 26TH ST	ST	P	X		N	L	48	C	6.80	I29-181A0010.jpg	I29-181I0011.jpg	32.38367	-88.68561	S		0
529	30	I29-182	M	Y	2401 HWY 39	SH	U	X		N	L	48	C	9.48	I29-182A0015.jpg	I29-182I0016.jpg	32.38336	-88.68464	S		6
530	30	I29-183	M	Y	2410 HWY 39 N.	SH	U	A	12	N	N	60	C	10.12	I29-183A0029.jpg	I29-183I0030.jpg	32.38350	-88.68369	S		0
531	30	I29-184	M	Y	2330 HWY 39N.	PL	P	X		N	L	48	C	7.10	I29-184A0012.jpg	I29-184I0013.jpg	32.38250	-88.68303	S		0
532	30	I29-184A	M	Y	2330 YWY 39N.	SH	U	A	56	N	N	48	C	9.04	I29-184AA0001.jpg	I29-184AI0002.jpg	32.38225	-88.68342	S		0
533	30	I29-184B	M	Y	2330 HWY 39N.	SH	U	A	10	N	M	48	C	4.42	I29-184BA0006.jpg	I29-184BI0007.jpg	32.38222	-88.68339	S		0
534	30	I29-184C	E	N	2330 HWY 39N.	SH	U								I29-184CA0011.jpg	No Internal Photo	32.38144	-88.68269			
535	30	I29-184D	M	L	No # HWY 39N.	ST	P								No Area Photo	No Internal Photo					
536	30	I29-184E	M	Y	2315 HWY 39 NORTH	SH	U	A	1	N	L	48	C	2.48	I29-184EA0008.jpg	I29-184EI0009.jpg	32.38242	-88.68391	S		0
537	30	I29-184F	M	Y	2315 HWY 39 NORTH	SH	U	A	29	N	N	48	C	9.48	I29-184FA0012.jpg	I29-184FI0013.jpg	32.38253	-88.68383	S		0
538	30	I29-184G	M	Y	2315 22ND ST.	SH	U	A	4	N	N	48	C	6.90	I29-184GA0001.jpg	I29-184GI0002.jpg	32.38206	-88.68428	S		0
539	30	I29-184H	M	Y	2315 22ND ST.	SH	U	B	6	N	S	48	C	7.88	I29-184HA0006.jpg	I29-184HI0007.jpg	32.38200	-88.68459	S		0
540	30	I29-184I	M	Y	2315 22ND ST.	SH	U	X		N	M	48	C	6.79	I29-184IA0011.jpg	I29-184II0012.jpg	32.38186	-88.68467	S		0
541	30	I29-184J	M	Y	2208 22ND ST.	SH	U	A	14	N	N	48	C	5.63	I29-184JA0015.jpg	I29-184JI0016.jpg	32.38167	-88.68467	S		0
542	30	I29-184K	M	Y	2208 22ND ST.	YD	U	A	6	N	N	48	C	4.96	I29-184KA0020.jpg	I29-184KI0021.jpg	32.38164	-88.68486	S		0
543	30	I29-184L	M	Y	2208 22ND ST.	SH	U	A	10	N	N	48	C	3.35	I29-184LA0026.jpg	I29-184LI0027.jpg	32.38139	-88.68486	S		0
544	30	I29-184M	M	Y	2208 22ND ST.	SH	U	A	5	N	L	48	C	2.44	I29-184MA0030.jpg	I29-184MI0031.jpg	32.38108	-88.68486	S		0
545	30	I29-184N	M	Y	2201 A 22ND ST.	SH	U	X		N	S	48	C	4.78	I29-184NA0035.jpg	I29-184NI0036.jpg	32.38033	-88.68489	S		0
546	30	I29-185	M	Y	2330 HWY 39 N.	PL	P	X		N	N	60	C	7.88	I29-185A0034.jpg	I29-185I0035.jpg	32.38258	-88.68317	S		0
547	30	I30-001	M	Y	2507 HWY 39 N.	DW	P	X		N	N	48	SB	4.86	I30-001A0017.jpg	I30-001I0018.jpg	32.38519	-88.68611	S		6
548	30	I30-002	M	Y	2507 HWY 39 N.	PL	P	X		N	N	48	C	5.14	I30-002A0013.jpg	I30-002I0014.jpg	32.38508	-88.68539	S		2
549	30	I30-003	M	Y	2518 6TH AVE	ST	P	X		N	N	48	B	4.38	I30-003A0008.jpg	I30-003I0009.jpg	32.38511	-88.68461	S		4
550	30	I30-004	M	L	No # 6TH AVE	ST	P								No Area Photo	No Internal Photo					
551	30	I30-005	M	Y	2518 6TH AVE	ST	P	X		N	N	48	B	6.56	I30-005A0001.jpg	I30-005I0002.jpg	32.38519	-88.68394	S		2
552	30	I30-010	M	Y	3211 12TH AVE	GU	P	X		N	M	48	B	4.64	I30-010A0014.jpg	I30-010I0015.jpg	32.39122	-88.69141	S		0
553	30	I30-010A	E	Y	3200 12TH AVE	ST	P								I30-010AA0020.jpg	No Internal Photo	32.39080	-88.69147			
554	30	I30-011	M	Y	1121 30 STREET	TW	U	A	41	N	L	48	C	12.50	I30-011A0017.jpg	I30-011I0018.jpg	32.38889	-88.69114	S		2
555	30	I30-012	M	Y	1121 30 AVENUE	TW	U	A	28	N	N	48	C	10.82	I30-012A0021.jpg	I30-012I0022.jpg	32.38889	-88.69078	S		10
556	30	I30-013	M	Y	3212 11 AVENUE	TW	U	A	20	N	L	48	C	5.84	I30-013A0005.jpg	I30-013I0006.jpg	32.39053	-88.69075	S		0
557	30	I30-013A	E	N	3212 11 AVENUE	TW	U								No Area Photo	No Internal Photo					
558	30	I30-014	M	Y	3212 11 AVENUE	TW	U	A	16	N	N	48	SB	4.98	No Area Photo	No Internal Photo	32.39089	-88.69072	S		0
559	30	I30-016	M	Y	2040 34TH ST	ST	P	X		N	N	48	B	6.52	No Area Photo	No Internal Photo	32.39236	-88.69067	S		3
560	30	I30-017	M	L	No # 11 AVENUE	TW	U								No Area Photo	No Internal Photo					
561	30	I30-018	M	Y	2925 10TH ST.	TW	U	B	2	N	S	48	C	7.36	I30-018A0027.jpg	I30-018I0028.jpg	32.38892	-88.68983	S		0
562	30	I30-019	M	L	No # 11 STREET	TW	U								No Area Photo	No Internal Photo					
563	30	I30-020	M	Y	2925 10TH AVE	TW	U	A	6	N	N	48	C	7.34	I30-020A0019.jpg	I30-020I0020.jpg	32.38975	-88.68978	S		3
564	30	I30-021	M	L	No # 11 AVENUE	TW	U								No Area Photo	No Internal Photo					
565	30	I30-022	M	Y	2925 10TH AVE.	TW	U	A	15	N	N	48	SB	7.22	I30-022A0025.jpg	I30-022I0026.jpg	32.39039	-88.68970	S		0
566	30	I30-023	M	Y	1103 33 STREET	TW	U	A	5	N	L	48	C	10.49	I30-023A0011.jpg	I30-023I0012.jpg	32.39178	-88.68978	S		0
567	30	I30-023A	M	Y	1020 34TH ST.	YD	U	A	3	N	M	48	C	8.72	I30-023AA0001.jpg	I30-023AI0002.jpg	32.39219	-88.68986	S		0
568	30	I30-033	M	Y	2725 HWY 39 N.	YD	U	X		N	N	48	C	6.60	I30-033A0021.jpg	I30-033I0022.jpg	32.38556	-88.68559	S		2
569	30	I30-033A	E	N	2725 HWY 39 N.	YD	U								No Area Photo	No Internal Photo	32.38605	-88.68552			
570	30	I30-038	M	L	No # HWY 39 N.	ST	P								No Area Photo	No Internal Photo					
571	30	I30-051	M	Y	2600 OLD MARION RD	ST	P	X		N	N	48	SB	5.52	No Area Photo	No Internal Photo	32.38708	-88.68022	V	4	0
572	30	I30-053	M	Y	2532 OLD MARION RD	ST	P	X		N	N	48	SB	5.66	No Area Photo	No Internal Photo	32.38625	-88.67995	V	4	0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
573	30	I30-069	M	Y	2420 4TH AVE	ST	P	X		N	L	48	B	7.82	I30-069A0052.jpg	I30-069I0053.jpg	32.38517	-88.68261	S		0
574	30	I30-069A	E	N	2420 4TH AVE	SH	U								I30-069AA0058.jpg	No Internal Photo	32.38531	-88.68259			0
575	30	I30-070	M	Y	2418 3RD AVE	YD	U	X		N	N	48	SB	5.28	No Area Photo	No Internal Photo	32.38519	-88.68181	S		2
576	30	I30-087	M	Y	2429 OLD MARION RD	ST	P	X		N	N	48	SB	6.88	No Area Photo	No Internal Photo	32.38550	-88.67983	V	4	0
577	30	I30-088	M	Y	2600 10TH ST	ST	P	X		N	L	48	C	11.55	I30-088A0027.jpg	I30-088I0028.jpg	32.38519	-88.68872	S		0
578	30	I30-090	M	Y	2925 30TH ST	ST	P	X		N	L	48	B	5.82	I30-090A0001.jpg	I30-090I0002.jpg	32.38861	-88.68822	S		0
579	30	I30-091	M	Y	819 30TH ST	ST	P	X		N	L	48	B	6.13	I30-091A0005.jpg	I30-091I0006.jpg	32.38864	-88.68725	S		8
580	30	I30-092	M	Y	2904 30TH ST	ST	P	X		N	L	48	B	6.40	I30-092A0009.jpg	I30-092I0010.jpg	32.38858	-88.68703	S		0
581	30	I30-092A	E	N	2904 30TH ST	ST	U	B	48						I30-092AA0015.jpg	No Internal Photo	32.38803	-88.68706			
582	30	I30-093	M	Y	801 30TH ST	ST	P	X		N	L	48	B	5.22	I30-093A0016.jpg	I30-093I0017.jpg	32.38861	-88.68647	S		0
583	30	I30-094	M	Y	502 30TH ST	ST	P	X		N	L	48	C	6.76	I30-094A0021.jpg	I30-094I0022.jpg	32.38864	-88.68555	S		0
584	30	I30-095	M	Y	502 30TH ST	ST	P	X		N	L	48	B	7.30	I30-095A0026.jpg	I30-095I0027.jpg	32.38858	-88.68506	S		0
585	30	I30-096	M	Y	407 31ST ST	ST	P	X		N	L	48	B	6.06	I30-096A0031.jpg	I30-096I0032.jpg	32.38936	-88.68472	S		6
586	30	I30-097	M	Y	3107 10TH AVE	ST	P	X		N	N	48	B	11.98	I30-097A0043.jpg	No Internal Photo	32.38967	-88.68853	S		6
587	30	I30-098	M	B	903 31ST ST	ST	P	B	6						I30-098A0053.jpg	No Internal Photo	32.38967	-88.68839			
588	30	I30-099	M	Y	803 31ST ST	ST	P	X		N	M	48	B	7.74	I30-099A0049.jpg	I30-099I0050.jpg	32.38956	-88.68700	S		0
589	30	I30-100	M	Y	3005 7TH AVE	ST	P	X		N	L	48	B	3.74	I30-100A0059.jpg	I30-100I0060.jpg	32.38886	-88.68625	S		6
590	30	I30-101	M	Y	3009 7TH ST	ST	P	X		N	L	48	B	6.74	I30-101A0054.jpg	I30-101I0055.jpg	32.38939	-88.68608	S		0
591	30	I30-102	M	Y	623 31ST ST	ST	P	X		N	M	48	B	6.36	I30-102A0044.jpg	I30-102I0045.jpg	32.38978	-88.68647	S		0
592	30	I30-105	M	Y	3102 31ST ST	ST	P	X		N	L	48	B	6.20	I30-105A0038.jpg	I30-105I0039.jpg	32.38969	-88.68550	S		0
593	30	I30-106	M	Y	3105 6TH AVE	ST	P	X		N	L	48	B	7.82	I30-106A0062.jpg	I30-106I0063.jpg	32.39030	-88.68550	S		4
594	30	I30-107	M	Y	407 31ST ST	ST	P	X		N	M	48	B	6.12	I30-107A0034.jpg	I30-107I0035.jpg	32.38967	-88.68430	S		3
595	30	I30-108	M	Y	3115 5TH AVE	SH	U	X		N	L	48	B	5.42	I30-108A0029.jpg	I30-108I0030.jpg	32.39039	-88.68403	S		8
596	30	I30-109	M	Y	2600 10TH AVE	ST	P	X		N	M	48	B	7.23	I30-109A0019.jpg	I30-109I0020.jpg	32.38536	-88.68880	S		0
597	30	I30-110	M	Y	2623 10TH AVE	ST	P	X		N	L	48	B	7.82	I30-110A0015.jpg	I30-110I0016.jpg	32.38628	-88.68870	S		0
598	30	I30-111	M	Y	2619 10TH AVE	ST	P	X		N	N	48	C	8.88	I30-111A0025.jpg	I30-111I0026.jpg	32.38611	-88.68867	S		0
599	30	I30-111A	M	Y	803 29TH ST (BLDG 19)	PL	P	X		N	L	48	C	9.60	I30-111AA0001.jpg	I30-111AI0002.jpg	32.38614	-88.68808	S		6
600	30	I30-111B	M	Y	803 39TH ST (BLDG 13)	PL	P	X		N	L	48	C	9.26	I30-111BA0006.jpg	I30-111BI0007.jpg	32.38689	-88.68808	S		3
601	30	I30-111C	M	Y	803 29TH ST (BLDG 16)	ST	P	X		N	L	48	C	8.96	I30-111CA0017.jpg	I30-111CI0018.jpg	32.38611	-88.68725	S		0
602	30	I30-111D	M	Y	803 29TH ST (BLDG 11)	YD	U	X		N	M	48	C	8.90	I30-111DA0011.jpg	I30-111DI0012.jpg	32.38731	-88.68775	S		0
603	30	I30-111E	M	Y	803 29TH ST (BLDG 17)	YD	U	X		N	L	48	C	9.20	I30-111EA0025.jpg	I30-111EI0026.jpg	32.38622	-88.68675	S		0
604	30	I30-111F	M	Y	803 29TH ST (BLDG 15)	PL	P	X		N	N	48	C	7.34	I30-111FA0022.jpg	I30-111FI0023.jpg	32.38567	-88.68736	S		4
605	30	I30-111G	M	Y	803 29TH ST (BLDG 4)	PL	P	X		N	L	48	C	7.84	I30-111GA0030.jpg	I30-111GI0031.jpg	32.38683	-88.68684	S		0
606	30	I30-111H	M	Y	803 29TH ST (BLDG 2)	YD	U	X		N	L	48	C	10.08	I30-111HA0035.jpg	I30-111HI0036.jpg	32.38725	-88.68689	S		0
607	30	I30-112	M	Y	2706 10TH ST	ST	P	X		N	M	48	B	9.30	I30-112A0008.jpg	I30-112I0009.jpg	32.38772	-88.68867	S		0
608	30	I30-113	M	Y	2631 10TH AVE	ST	P	X		N	M	48	C	10.30	I30-113A0030.jpg	I30-113I0031.jpg	32.38692	-88.68864	S		0
609	30	I30-114	M	Y	2921 10TH AVE	GU	P	X		N	M	48	B	10.54	I30-114A0001.jpg	I30-114I0002.jpg	32.38861	-88.68864	S		0
610	30	I30-115	M	Y	2903 10TH AVE	ST	P	X		N	M	48	C	12.40	I30-115A0035.jpg	I30-115I0036.jpg	32.38786	-88.68861	S		0
611	30	I30-119	M	Y	3000 10TH AVE	ST	P	X		N	L	48	C	14.28	I30-119A0039.jpg	I30-119I0040.jpg	32.38886	-88.68850	S		0
612	30	I31-001	M	L	No # N. PINE ST	ST	P								No Area Photo	No Internal Photo					
613	30	I31-002	M	Y	3827 13TH PL	YD	U	X		N	M	48	B	6.58	I31-002A0008.jpg	I31-002I0009.jpg	32.39686	-88.69261	S		0
614	30	I31-003	M	Y	1407 N. PINE ST	ST	P	X		N	L	48	B	7.14	I31-003A0001.jpg	I31-003I0002.jpg	32.39728	-88.69267	S		0
615	30	I31-004	M	Y	1317 34TH ST	ST	P	X		N	L	48	B	5.98	I31-004A0021.jpg	I31-004I0022.jpg	32.39231	-88.69219	S		0
616	30	I31-005	M	Y	1204 12TH AVE	ST	P	X		N	L	48	SB	8.98	I31-005A0007.jpg	I31-005I0008.jpg	32.39214	-88.69144	S		3
617	30	I31-006	M	L	No # 12TH AVE	ST	P								No Area Photo	No Internal Photo					
618	30	I31-006A	M	Y	3403 12TH ST	SH	U	A	3	N	M	48	C	6.14	I31-006AA0011.jpg	I31-006AI0012.jpg	32.39278	-88.69141	S		3
619	30	I31-008	M	Y	3808 13TH AVE	YD	U	A	7	N	N	48	B	8.06	I31-008A0036.jpg	I31-008I0037.jpg	32.39569	-88.69141	S		0
620	30	I31-009	M	L	No # 13 AVENUE	SH	U								No Area Photo	No Internal Photo					
621	30	I31-010	M	L	No # 13 AVENUE	SH	U								No Area Photo	No Internal Photo					
622	30	I31-011	M	Y	3808 13TH AVE	TW	U	A	19	N	N	48	C	9.88	I31-011A0042.jpg	I31-011I0043.jpg	32.39567	-88.69139	S		0
623	30	I31-012	M	Y	3900 COUNTRY CLUB DR	YD	U	A	4	N	N	48	B	5.56	I31-012A0019.jpg	I31-012I0020.jpg	32.39722	-88.69161	S		0
624	30	I31-013	M	Y	3818 13TH AVE	YD	U	A	17	N	N	48	C	8.86	I31-013A0049.jpg	I31-013I0050.jpg	32.39642	-88.69128	S		0

Definitions:

Asset Type: Manhole=M; E=End of Line; C=Cleanout
Manhole Inspection Status: Y=Yes; L=Could Not Locate; B=Buried; O=Can Not Open;S=Surcharged; N=No Access; D=Dog; LG=Locked Gate; H=Homeowner
Surface Cover: SH=Shoulder; DD=Drainage Ditch; DW=Driveway; ST=Street; FD=Field; SW=Sidewalk; AL=Alley, YD=Yard; GU=Gutter; PL=Parking Lot; WB=Within Building/Property
Surface Material: P=Paved; U=Unpaved Manhole Grade: A=Above Grade; X=At Grade; B=Below Grade Grade: Inches
Inflow Dish: Y=Yes; N=No Inflow Potential: N=None; L=Light; M=Mediaum; S=Severe
Manhole Diameter: Inches; Manhole Material: B=Brick; F=Fibergalss; C=Concrete; SC=Sealed Concrete, SB=Sealed Brick
Rim to Invert Distance: feet; Lid Type: S=Solid; V=Vented

Appendix A - Manhole Inventory (Basin 5, 17 & 30)

Item	Basin	Manhole Number	Asset Type	Manhole Inspection	Address	Surface Cover	Surface Material	Manhole Grade	Grade Inches	Inflow Dish	Inflow Potential	Manhole Diameter	Manhole Material	Rim to Invert Depth - ft	Area Photo	Internal Photo	GPS N	GPS WO	Lid Type	No. Vent Holes	Debris Depth
625	30	I31-014	M	Y	3900 COUNTRY CLUB DR	YD	U	A	7	N	N	48	C	9.40	I31-014A0013.jpg	I31-014I0014.jpg	32.39736	-88.69125	S		0
626	30	I31-014A	M	Y	3900 COUNTRY CLUB DR	YD	U	A	6	N	N	48	C	6.06	I31-014AA0025.jpg	I31-014AI0026.jpg	32.39817	-88.69133	S		0
627	30	I31-014B	M	Y	3900 COUNTRY CLUB DR	YD	U	A	4	N	N	48	C	7.26	I31-014BA0030.jpg	I31-014BI0031.jpg	32.39894	-88.69122	S		0
628	30	I31-015	M	Y	1130 34TH ST	ST	P	X		N	L	48	C	7.46	I31-015A0001.jpg	I31-015I0002.jpg	32.39233	-88.69122	S		0
629	30	I31-016	M	Y	2040 34TH ST	ST	P	X		N	N	48	B	6.52	I31-016A0040.jpg	I31-016I0041.jpg	32.39236	-88.69067	S		3
630	30	I31-017	M	Y	3434 11TH AVE	ST	P	X		N	M	48	B	4.14	I31-017A0047.jpg	I31-017I0048.jpg	32.39344	-88.69061	S		0
631	30	I31-018	M	L	No # 13 AVENUE	TW	U								No Area Photo	No Internal Photo					
632	30	I31-019	M	Y	3808 13 AVENUE	TW	U	A	26	N	N	48	C	8.06	I31-019A0005.jpg	I31-019I0006.jpg	32.39578	-88.69064	S		0
633	30	I31-023	M	Y	1106 33 STREET	ST	P	X		N	L	48	B	9.20	I31-023A0001.jpg	I31-023I0002.jpg	32.39231	-88.68989	S		0
634	30	I30-023A	M	Y	1020 34TH ST.	YD	U	A	10	N	N	48	C	7.26	I31-023AA0006.jpg	I31-023AI0007.jpg	32.39328	-88.68978	S		0
635	30	I31-024	M	L	No # 10 AVENUE	TW	U								No Area Photo	No Internal Photo					
636	30	I31-025	M	Y	3615 10 AVENUE	TW	U	A	27	N	L	48	C	7.28	I31-025A0006.jpg	I31-025I0007.jpg	32.39364	-88.68972	S		0
637	30	I31-027	M	L	No # 10 AVENUE	TW	U								No Area Photo	No Internal Photo					
638	30	I31-028	M	Y	3808 13 AVENUE	TW	U	A	16	N	N	48	C	7.78	I31-028A0001.jpg	I31-028I0002.jpg	32.39578	-88.69064	S		0
639	30	I31-029	M	L	No # 10 AVENUE	TW	U								No Area Photo	No Internal Photo					
640	30	I31-031	M	L	No # 13 AVENUE	TW	U								No Area Photo	No Internal Photo					
641	30	I31-092	M	Y	3900 COUNTRY CLUB DR	YD	U	A	10	N	N	48	C	10.14	I31-092A0051.jpg	I31-092I0052.jpg	32.39769	-88.69217	S		0
642	30	I31-093	M	Y	3900 COUNTRY CLUB DR	YD	U	A	6	N	L	48	C	9.92	I31-093A0055.jpg	I31-093I0056.jpg	32.39742	-88.69211	S		0
643	30	I31-094	M	B	3900 COUNTRY CLUB DR	YD	U	B	14						I31-094A0060.jpg	No Internal Photo	32.39747	-88.69197			

Appendix B
Original Pump Station Inventory From Meridian

LIFT STATION LOCATION SOWASKEE CREEK INSTALLED

PUMP NO. 1
MAKE MODEL
SPECIFICS
VENDOR

PUMP NO. 2
MAKE MODEL
SPECIFICS
VENDOR

CONTROLLER

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION LOCATION THE COMMONS INSTALLED

PUMP NO. 1
MAKE MODEL
SPECIFICS
VENDOR

PUMP NO. 2
MAKE MODEL
SPECIFICS
VENDOR

CONTROLLER

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION LOCATION KNIGHT PARKER RD INSTALLED

PUMP NO. 1
MAKE MODEL
SPECIFICS
VENDOR

PUMP NO. 2
MAKE MODEL
SPECIFICS
VENDOR

CONTROLLER

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION	RIVER BIRCH LIFT STATION	INSTALLED	12/1/05
LOCATION	HIGHWAY 19 NORTH &67AVE LOOP		

PUMP NO. 1
MAKE MODEL
SPECIFICS
VENDOR

PUMP NO. 2
MAKE MODEL
SPECIFICS
VENDOR

CONTROLLER

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION	LOVERS LANE	INSTALLED 1986	MOTERS REPLACED 1998
LOCATION	OLD 8TH STREET ROAD & LOVERS LANE		

PUMP NO. 1					
MAKE	PUMPEX	MODEL	K102-CA3200		
SPECIFICS	4" FLANGE 230 VOLT 3 PHASE		6.5 H/P	TDH40	GPM192
VENDOR	J. H . WRIGHT				

PUMP NO. 2					
MAKE	PUMPEX	MODEL	K102-CA3200		
SPECIFICS	4" FLANGE 230 VOLT 3 PHASE 6.5 H/P			TDH40	GPM192
VENDOR	J. H. WRIGHT				

CONTROLLER FLYGT

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION	NORTH HILL STREET	INSTALLED	4/1/04
LOCATION	NORTH HILL STREET IN YARD		
MAKE	MODEL		
SPECIFICS			
VENDOR	J.H.WRIGHT		
CONTROLLER	HOME MADE		

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION	56 TH PLACE				INSTALLED	1999
LOCATION	DEAD END 56TH PLACE					
MAKE	BARNS		MODEL			
SPECIFICS	220 VOLT	S/PHASE		2 H/P	25 TDH	75 GPM
VENDOR	J.H. WRIGHT					
CONTROLLER	J H WRIGHT					

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx
DATE / 01-02		POWER BILL			TOTAL YTD	
10/1/00	0.00				0.00	
11/1/00	0.00				0.00	
12/1/00	0.00				0.00	
1/1/00	0.00				0.00	
2/1/00	0.00				0.00	
3/1/00	0.00				0.00	
4/1/00	0.00				0.00	
5/1/00	0.00				0.00	
6/1/00	0.00				0.00	
7/1/00	0.00				0.00	
8/1/00	0.00				0.00	
9/1/00	0.00				0.00	
	0.00				0.00	
TOTAL FOR YR	0.00				0.00	
xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx

LIFT STATION	10 AVE NORTH				INSTALLED	2003
LOCATION	winmill sub					
MAKE	4" BARNES		MODEL	4SE2824L		
SPECIFICS	S/P 230 VOLT		2.8 H/P	12.6 FLA		S/N 748476
VENDOR	j h wright					
CONTROLLER	c.s.i. jackson ms					

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx
DATE / 01-02		POWER BILL			TOTAL YTD	
10/1/00	0.00				0.00	
11/1/00	0.00				0.00	
12/1/00	0.00				0.00	
1/1/00	0.00				0.00	
2/1/00	0.00				0.00	
3/1/00	0.00				0.00	
4/1/00	0.00				0.00	
5/1/00	0.00				0.00	
6/1/00	0.00				0.00	
7/1/00	0.00				0.00	
8/1/00	0.00				0.00	
9/1/00	0.00				0.00	
	0.00				0.00	
TOTAL FOR YR	0.00				0.00	

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx

S/N753304

LIFT STATION	38TH STREET LIFT STATION				INSTALLED	11/1/00
LOCATION	38TH STREET & 24 AVE					
MAKE	PUMPEX		MODEL	K80F-CB-3180		
SPECIFICS	230 VOLT S/P		TDH 34		150 GPM	
VENDOR	J. H. WRIGHT					
CONTROLLER	CONTROL SYSTEMS INC		RONK ADD A PHASE			

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx
DATE / 01-02		POWER BILL			TOTAL YTD	
10/1/00	0.00				0.00	
11/1/00	0.00				0.00	
12/1/00	0.00				0.00	
1/1/00	0.00				0.00	
2/1/00	0.00				0.00	
3/1/00	0.00				0.00	
4/1/00	0.00				0.00	
5/1/00	0.00				0.00	
6/1/00	0.00				0.00	
7/1/00	0.00				0.00	
8/1/00	0.00				0.00	
9/1/00	0.00				0.00	
	0.00				0.00	
TOTAL FOR YR	0.00				0.00	

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx

LIFT STATION	COTTON GIN ROAD				INSTALLED	11/20/03
LOCATION	COTTON GIN ROAD & RED BARON RD					
MAKE	PUMPEX		MODEL	K154-FC-D3290		
SPECIFICS	6" 480 VOLT 3 PHASE	56 H/P	64.1		90 tdh	1600 gpm
VENDOR	J H WRIGHT					
CONTROLLER	C.S.I.					

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx
DATE / 01-02		POWER BILL			TOTAL YTD	
10/1/00	0.00				0.00	
11/1/00	0.00				0.00	
12/1/00	0.00				0.00	
1/1/00	0.00				0.00	
2/1/00	0.00				0.00	
3/1/00	0.00				0.00	
4/1/00	0.00				0.00	
5/1/00	0.00				0.00	
6/1/00	0.00				0.00	
7/1/00	0.00				0.00	
8/1/00	0.00				0.00	
9/1/00	0.00				0.00	
	0.00				0.00	
TOTAL FOR YR	0.00				0.00	

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx

LIFT STATION	SOUTH INDUSTRAIL PARK			INSTALLED	#1]01\16\92 #2 09\9\91
LOCATION	HIGH WAY 11 SOUTH				
MAKE	BARNES	MODEL	4SE15034L		
SPECIFICS	230 VOLT 3\PH 15 H\P FLA. 42		TDH 30	GPM 750	
VENDOR	J H WRIGHT				
CONTROLLER	CONTROL SYSTEMS INC.	INSTALLED 01\22\2000			

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	51.38	51.38
11/1/00	0.00	51.38
12/1/00	0.00	51.38
1/1/00	0.00	51.38
2/1/00	0.00	51.38
3/1/00	0.00	51.38
4/1/00	0.00	51.38
5/1/00	0.00	51.38
6/1/00	0.00	51.38
7/1/00	0.00	51.38
8/1/00	0.00	51.38
9/1/00	0.00	51.38
	0.00	51.38
TOTAL FOR YR	0.00	51.38

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LIFT STATION	TOM REGAN ROAD			INSTALLED	04\96
LOCATION	65 AVE				
MAKE	BARNES	MODEL	4SE4534L		
SPECIFICS	230 VOLT 3 \PH FLA.18	TDH 30	GPM 100		
VENDOR	J H WRIGHT				
CONTROLLER	CONTROL SYSTEM INC.				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	12.66	12.66
11/1/00	0.00	12.66
12/1/00	0.00	12.66
1/1/00	0.00	12.66
2/1/00	0.00	12.66
3/1/00	0.00	12.66
4/1/00	0.00	12.66
5/1/00	0.00	12.66
6/1/00	0.00	12.66
7/1/00	0.00	12.66
8/1/00	0.00	12.66
9/1/00	0.00	12.66
	0.00	12.66
TOTAL FOR YR	0.00	12.66

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

problems

LIFT STATION	70TH PLACE			INSTALLED	1\19\96
LOCATION	OLD 8TH STREET ROAD				
MAKE	GOULD	MODEL	4SD12J1AA		
SPECIFICS	230 VOLT 3\PH FLA 16.6 TDH	35	GPM200		
VENDOR	GENERL PUMP				
CONTROLLER	CONTROL SYSTEMS				

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	53.06	53.06
11/1/00	0.00	53.06
12/1/00	0.00	53.06
1/1/00	0.00	53.06
2/1/00	0.00	53.06
3/1/00	0.00	53.06
4/1/00	0.00	53.06
5/1/00	0.00	53.06
6/1/00	0.00	53.06
7/1/00	0.00	53.06
8/1/00	0.00	53.06
9/1/00	0.00	53.06
	0.00	53.06
TOTAL FOR YR	0.00	53.06

problem			cost	total
#1 12/4/00	phase monitor out	phase monitor& 8 pin socket		

LIFT STATION	65 AVE				INSTALLED	#11992	#2 1994
LOCATION	65 AVE						
MAKE	#1YEOMAN	#2 PUMPEX		MOD	#1\S56415	#2\K106-FCC3245	
SPECIFICS	230 VOLT 3 \PH	#1\ 25H\P	#2\ 24 H\P	TDH 35	GPM 1200		
VENDOR	#1\GENERL PUMP		#2 \J H WRIGHT				
CONTROLLER	CONTROL SYSTEMS INC						

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	325.04		325.04
11/1/00	0.00		325.04
12/1/00	0.00		325.04
1/1/00	0.00		325.04
2/1/00	0.00		325.04
3/1/00	0.00		325.04
4/1/00	0.00		325.04
5/1/00	0.00		325.04
6/1/00	0.00		325.04
7/1/00	0.00		325.04
8/1/00	0.00		325.04
9/1/00	0.00		325.04
	0.00		325.04
TOTAL FOR YR	0.00		325.04

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LIFT STATION	LOWER BOUNDS ROAD			INSTALLED	9/1/04
LOCATION	CHANDLER ROAD				
MAKE	PUMPEX	MODEL	18 H/P K86-VE1190	MYERS	
SPECIFICS	230 VOLT 3\PH TDH150 GPM150		#1 PUMP		
VENDOR	J.H. WRIGHT	GULF COAST PUMPS			
CONTROLLER	CONTROLS OF HOUSTON				

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	136.86		136.86
11/1/00	0.00		136.86
12/1/00	0.00		136.86
1/1/00	0.00		136.86
2/1/00	0.00		136.86
3/1/00	0.00		136.86
4/1/00	0.00		136.86
5/1/00	0.00		136.86
6/1/00	0.00		136.86
7/1/00	0.00		136.86
8/1/00	0.00		136.86
9/1/00	0.00		136.86
	0.00		136.86
TOTAL FOR YR	0.00		136.86

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PROBLEMS	REPLACED # 1PUMP WITH REBUILT FROM HWY 39 #2 DATE	10/4/00	COST	$3.100.00
11-28 re	replaced #2pump checkvalve		cost	
1/22/04	replaced #1 pump with pumpex		cost	$5,870.00
09/2004 INSTALL MYERS PUMP				

LIFT STATION	8 TH AVE NORTH			INSTALLED	06\90
LOCATION	8TH AVE	pump sn/ 61-26398-B		[mod SS4410]	
MAKE	RELIANCE	MODEL	X210TY	ID N0#P21G2701H-YP	
SPECIFICS	230 VOLT 3 PH 10 H\P	FLA.37	tdh 102	GPM 120	
VENDOR	GENERL PUMP				
CONTROLLER	CONTROL SYSTEMS INC.				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	14.68	14.68
11/1/00	0.00	14.68
12/1/00	0.00	14.68
1/1/00	0.00	14.68
2/1/00	0.00	14.68
3/1/00	0.00	14.68
4/1/00	0.00	14.68
5/1/00	0.00	14.68
6/1/00	0.00	14.68
7/1/00	0.00	14.68
8/1/00	0.00	14.68
9/1/00	0.00	14.68
	0.00	14.68
TOTAL FOR YR	0.00	14.68

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LIFT STATION	NEWELL ROAD #1			INSTALLED	10\94
LOCATION	NEWELL ROAD				
MAKE	BARNES	MODEL	4SE15034L		
SPECIFICS	230 VOLT 3\PH 15 H\P	FLA	TDH75	GPM 275	
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	55.06	55.06
11/1/00	0.00	55.06
12/1/00	0.00	55.06
1/1/00	0.00	55.06
2/1/00	0.00	55.06
3/1/00	0.00	55.06
4/1/00	0.00	55.06
5/1/00	0.00	55.06
6/1/00	0.00	55.06
7/1/00	0.00	55.06
8/1/00	0.00	55.06
9/1/00	0.00	55.06
	0.00	55.06
TOTAL FOR YR		55.06

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

LIFT STATION				INSTALLED	
LOCATION	56 TH COURT			INSTALLED	9/12/96
MAKE	BARNES	MODEL	4SE2024L		
SPECIFICS	220 VOLT S\P 3\4 H\P FLA. 10 TDH 25 GPM 50				
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	13.24	13.24
11/1/00	0.00	13.24
12/1/00	0.00	13.24
1/1/00	0.00	13.24
2/1/00	0.00	13.24
3/1/00	0.00	13.24
4/1/00	0.00	13.24
5/1/00	0.00	13.24
6/1/00	0.00	13.24
7/1/00	0.00	13.24
8/1/00	0.00	13.24
9/1/00	0.00	13.24
	0.00	13.24
TOTAL FOR YR	0.00	13.24

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

LIFT STATION	NORTH WOOD EAST APT		INSTALLED		1993	INSTALLED
LOCATION	HIGH WAY 39 NORTH					
MAKE	BARNES	MODEL	4SE2854IMS			#2 ABS
SPECIFICS	230 VOLT 3\PH 2.8 H\P	FLA 10	TDH 30	GPM 150		5 H/P
VENDOR	J H WRIGHT					
CONTROLLER	CONTROLS OF HOUSTON					

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	129.28		129.28
11/1/00	0.00		129.28
12/1/00	0.00		129.28
1/1/00	0.00		129.28
2/1/00	0.00		129.28
3/1/00	0.00		129.28
4/1/00	0.00		129.28
5/1/00	0.00		129.28
6/1/00	0.00		129.28
7/1/00	0.00		129.28
8/1/00	0.00		129.28
9/1/00	0.00		129.28
	0.00		129.28
TOTAL FOR YR	0.00		129.28

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4\ 2005

EJ-50DL4MS
230 V 3 PHASE

=

LIFT STATION	61 COURT				INSTALLED	2003
LOCATION	61 COURT					
MAKE	BARNES			MOD		
SPECIFICS	230 VOLT 3\PH	FLA	TDH 55	GPM 75		
VENDOR	J H WRIGHT					
CONTROLLER	E .G. GULF STATE ENG.					

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	50.78		50.78
11/1/00	0.00		50.78
12/1/00	0.00		50.78
1/1/00	0.00		50.78
2/1/00	0.00		50.78
3/1/00	0.00		50.78
4/1/00	0.00		50.78
5/1/00	0.00		50.78
6/1/00	0.00		50.78
7/1/00	0.00		50.78
8/1/00	0.00		50.78
9/1/00	0.00		50.78
	0.00		50.78
TOTAL FOR YR	0.00		50.78

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LIFT STATION	HIGH WAY 39 #1 STATION		INSTALLED	#1 6\25\00	#2 7\10\92
LOCATION	HIGH WAY 39 NORTH				
MAKE	#1 PUMPEX	K152F-CA-3275	BARNES	MODEL	6SE48044HL
SPECIFICS	480 VOLT 3\PH	36HP\ TDH 75 \GPM1200	480 VOLT/3PH-40-HP/TDH		75 GPM120(
VENDOR	J H WRIGHT				
CONTROLLER	CONTROL SYSTEMS INC.	INSTALLED 9\99			

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	36.56	36.56
11/1/00	0.00	36.56
12/1/00	0.00	36.56
1/1/00	0.00	36.56
2/1/00	0.00	36.56
3/1/00	0.00	36.56
4/1/00	0.00	36.56
5/1/00	0.00	36.56
6/1/00	0.00	36.56
7/1/00	0.00	36.56
8/1/00	0.00	36.56
9/1/00	0.00	36.56
	0.00	36.56
TOTAL FOR YR	0.00	36.56

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			COST	TOTAL
problem 11/24/00	repair #1 pump		none	
	repair #2 pump (barnes)		$1.760.00	
parts	replace 6 in check valve	#1pump		
	replace6 in check valve &valve			
parts	2 x4 ft flange nipple			
	8 flange ass kits			
	2 uniflanges 6"			
	1 custom flg spec. mach.		$202.23	

)

LIFT STATION	HIGH WAY 39# 2 LIFT STATION	INSTALLED	11\28\98
LOCATION	HIGHWAY 39 NORTH		
MAKE	PUMPEX	MODEL	K86F-VC-1190
SPECIFICS	230 VOLT 3 \PH 26 \HP FLA. 73 TDH143 GPM 250		
VENDOR	J H WRIGHT		
CONTROLLER	CONTROL SYSTEMS INC.		

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	28.00	28.00
11/1/00	0.00	28.00
12/1/00	0.00	28.00
1/1/00	0.00	28.00
2/1/00	0.00	28.00
3/1/00	0.00	28.00
4/1/00	0.00	28.00
5/1/00	0.00	28.00
6/1/00	0.00	28.00
7/1/00	0.00	28.00
8/1/00	0.00	28.00
9/1/00	0.00	28.00
	0.00	28.00
TOTAL FOR YR		28.00

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PROBLEMS

PARTS

LIFT STATION	NORTH HILLS STREET				INSTALLED	5-94
LOCATION	6520 NORTH HILL STREET					
MAKE	BARNES		MODEL	4SE1424L		
SPECIFICS	220 S\P	1.5 H\P	FLA 8	TDH 20	GPM 45	
VENDOR	J H WRIGHT					
CONTROLLER	CONTROLS OF HOUSTON					

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	10.56		10.56
11/1/00	0.00		10.56
12/1/00	0.00		10.56
1/1/00	0.00		10.56
2/1/00	0.00		10.56
3/1/00	0.00		10.56
4/1/00	0.00		10.56
5/1/00	0.00		10.56
6/1/00	0.00		10.56
7/1/00	0.00		10.56
8/1/00	0.00		10.56
9/1/00	0.00		10.56
	0.00		10.56
TOTAL FOR YR	0.00		10.56

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LIFT STATION	DOG WOOD DRIVE			INSTALLED	1995
LOCATION	DOG WOOD DRIVE				
MAKE	BARNES	MODEL	4SE11334L		
SPECIFICS	230 VOLT 3\PH H\P 11.3	FLA.28	TDH 25	GPM 275	
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	63.20	63.20
11/1/00	0.00	63.20
12/1/00	0.00	63.20
1/1/00	0.00	63.20
2/1/00	0.00	63.20
3/1/00	0.00	63.20
4/1/00	0.00	63.20
5/1/00	0.00	63.20
6/1/00	0.00	63.20
7/1/00	0.00	63.20
8/1/00	0.00	63.20
9/1/00	0.00	63.20
	0.00	63.20
TOTAL FOR YR	0.00	63.20

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LIFT STATION	VIRGINIA DRIVE				INSTALLED	5-93
LOCATION	VIRGINIA DRIVE					
MAKE	BARNES		MODEL	4SE1424L		
SPECIFICS	220 VOLT S\P	1.5 H\P	FLA.	TDH 20	GPM 30	
VENDOR	J H WRIGHT					
CONTROLLER	FLYGT					

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	10.56		10.56
11/1/00	0.00		10.56
12/1/00	0.00		10.56
1/1/00	0.00		10.56
2/1/00	0.00		10.56
3/1/00	0.00		10.56
4/1/00	0.00		10.56
5/1/00	0.00		10.56
6/1/00	0.00		10.56
7/1/00	0.00		10.56
8/1/00	0.00		10.56
9/1/00	0.00		10.56
	0.00		10.56
TOTAL FOR YR	0.00		10.56

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LIFT STATION	JAMES RIVER			INSTALLED	08\01\94
LOCATION	VIRGINIA DRIVE				
MAKE	BARNES	MODEL	4SE11334L		
SPECIFICS	230 V0LT 3 P\H 11.3 H\P	30 TDH	100 GPM		
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	11.91	11.91
11/1/00	0.00	11.91
12/1/00	0.00	11.91
1/1/00	0.00	11.91
2/1/00	0.00	11.91
3/1/00	0.00	11.91
4/1/00	0.00	11.91
5/1/00	0.00	11.91
6/1/00	0.00	11.91
7/1/00	0.00	11.91
8/1/00	0.00	11.91
9/1/00	0.00	11.91
	0.00	11.91
TOTAL FOR YR	0.00	11.91

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WARE HOUSE 1ST STREET &29 AVE INSTALLED
LOCATION
MAKE MODEL
SPECIFICS
VENDOR
CONTROLLER

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	19.78	19.78
11/1/00	0.00	19.78
12/1/00	0.00	19.78
1/1/00	0.00	19.78
2/1/00	0.00	19.78
3/1/00	0.00	19.78
4/1/00	0.00	19.78
5/1/00	0.00	19.78
6/1/00	0.00	19.78
7/1/00	0.00	19.78
8/1/00	0.00	19.78
9/1/00	0.00	19.78
	0.00	19.78
TOTAL FOR YR	0.00	19.78

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LIFT STATION	VILLAGE FAIR MALL			INSTALLED	1990
LOCATION	NORTH FRONTAGE ROAD				
MAKE	HYDROMATIC	MODEL	S4NRC100-M36		
SPECIFICS	230 VOLT 3\PH H\P 1	FLA.	TDH 20	GPM 80	
VENDOR	ENGINEERED ENVIROMMENTAL EQUIPTMENT				
CONTROLLER	ENGINEERED EVIROMMENTAL EQUIPTMENT				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	16.51	16.51
11/1/00	0.00	16.51
12/1/00	0.00	16.51
1/1/00	0.00	16.51
2/1/00	0.00	16.51
3/1/00	0.00	16.51
4/1/00	0.00	16.51
5/1/00	0.00	16.51
6/1/00	0.00	16.51
7/1/00	0.00	16.51
8/1/00	0.00	16.51
9/1/00	0.00	16.51
	0.00	16.51
TOTAL FOR YR	0.00	16.51

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LIFT STATION	A AVE			INSTALLED #1 84		#2 3|00	
LOCATION	2213 A AVE			1978			
MAKE	RELIANCE	MODEL	P17G2705F	#2 BARNES 4SE5094L			
SPECIFICS	3 H\P 230 VOLT 3 P\H	35TDH	GPM 250	#2 230 V0LT 3PH[5H\P		100GPM	
VENDOR	MENGE PUMP AND POWER						
CONTROLLER	WATCH PUMP						

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	14.08		14.08
11/1/00	0.00		14.08
12/1/00	0.00		14.08
1/1/00	0.00		14.08
2/1/00	0.00		14.08
3/1/00	0.00		14.08
4/1/00	0.00		14.08
5/1/00	0.00		14.08
6/1/00	0.00		14.08
7/1/00	0.00		14.08
8/1/00	0.00		14.08
9/1/00	0.00		14.08
	0.00		14.08
TOTAL FOR YR	0.00		14.08

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PROBLEMS	REPLACE #2 PUMP		P0 #004353	DATE 3\10\00	COST	$1,478.00	1,478.00
	INSTALL PORTABLE LIFT STATION HOOK UP						
PARTS	QUANTITY	SIZE					
	1	4"	MJ VALVE			$157.00	
	8	4"	SET RING KITS			$69.60	
	1	4"	DIP TEE			$54.00	
	1	4""	90 BEND			$34.50	
	3	6"	SET RING KITS			$36.74	
	2	4"	PVC MALE ADAPTER			$23.25	
	20'	4"	SCH 80 PVC			$43.00	
		TOTAL COST OFPIPE AND FITTING					418.09
PARTS	P-U-250 250 1COND TERM LUG			SOUTHERN ELE.		$4.11	

LIFT STATION	TOM BAILEY DRIVE			INSTALLED	12/1/05	2000
LOCATION	HIGH WAY 11 AND 80					
MAKE	ABS	#2BARNES	MOD	EJ3OD-AMS		4SE1534
SPECIFICS	230 VOLT 3\PH	9.4 H\P	FLA.	TDH 25	GPM 300	
VENDOR	GULF STATES ENG		J H WRIGHT	PUMP PURCHASED 12\20\94 LOVER LANE		
CONTROLLER	FLYGT					

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	18.02	18.02
11/1/00	0.00	18.02
12/1/00	0.00	18.02
1/1/00	0.00	18.02
2/1/00	0.00	18.02
3/1/00	0.00	18.02
4/1/00	0.00	18.02
5/1/00	0.00	18.02
6/1/00	0.00	18.02
7/1/00	0.00	18.02
8/1/00	0.00	18.02
9/1/00	0.00	18.02
	0.00	18.02
TOTAL FOR YR	0.00	18.02

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LIFT STATION	9TH AVE				INSTALLED	9\1\93		
LOCATION	5TH STREET 9TH AVE							
MAKE	BARNES		MODEL	4SE2834L		GOULD	MOD	
SPECIFICS	230 VOLT 3\PH FLA. 18	TDH 18	GPM	150			230 VOLT 3P	
VENDOR	J H WRIGHT							
CONTROLLER	CONTROLS OF HOUSTON							

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	33.86		33.86
11/1/00	0.00		33.86
12/1/00	0.00		33.86
1/1/00	0.00		33.86
2/1/00	0.00		33.86
3/1/00	0.00		33.86
4/1/00	0.00		33.86
5/1/00	0.00		33.86
6/1/00	0.00		33.86
7/1/00	0.00		33.86
8/1/00	0.00		33.86
9/1/00	0.00		33.86
	0.00		33.86
TOTAL FOR YR	0.00		33.86

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9/1/04

4SD52F3DA
PHASE 1.5 H/P

LIFT STATION	DAYS INN		INSTALLED	10\93	#2installed
LOCATION	HIGH WAY 8O EAST				
MAKE	BARNES MODEL	4SE2834L			
SPECIFICS	230 VOLT 3\PH	2.8 H\P	TDH18	GPM 150	
VENDOR	J H WRIGHT				
CONTROLLER	UNKNOWN				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	27.07	27.07
11/1/00	0.00	27.07
12/1/00	0.00	27.07
1/1/00	0.00	27.07
2/1/00	0.00	27.07
3/1/00	0.00	27.07
4/1/00	0.00	27.07
5/1/00	0.00	27.07
6/1/00	0.00	27.07
7/1/00	0.00	27.07
8/1/00	0.00	27.07
9/1/00	0.00	27.07
	0.00	0.00
TOTAL FOR YR	0.00	27.07

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problem		cost	total
12/9/00	reoplaced #1 starter &thero over load		
	#2 pump down orered new pump 12/11/00		

BONITA BOOSTER INSTALLED
LOCATION BONITA DRIVE
MAKE MODEL
SPECIFICS
VENDOR
CONTROLLER

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	214.99		214.99
11/1/00	0.00		214.99
12/1/00	0.00		214.99
1/1/00	0.00		214.99
2/1/00	0.00		214.99
3/1/00	0.00		214.99
4/1/00	0.00		214.99
5/1/00	0.00		214.99
6/1/00	0.00		214.99
7/1/00	0.00		214.99
8/1/00	0.00		214.99
9/1/00	0.00		214.99
			214.99
TOTAL FOR YR			214.99

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LIFT STATION	RED LOBSTER [SOUTH FRONTAGE RD]			INSTALLED	01\95	
LOCATION	BONITA DRIVE					
MAKE	BARNES	6SE24034L				
SPECIFICS	230 VOLT 3\PH H\P24	FLA.	TDH 55	GPM 1000		
VENDOR	J H WRIGHT					
CONTROLLER	CONTROL SYSTEMS INC			2003		

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	130.49		130.49
11/1/00	0.00		130.49
12/1/00	0.00		130.49
1/1/00	0.00		130.49
2/1/00	0.00		130.49
3/1/00	0.00		130.49
4/1/00	0.00		130.49
5/1/00	0.00		130.49
6/1/00	0.00		130.49
7/1/00	0.00		130.49
8/1/00	0.00		130.49
9/1/00	0.00		130.49
	0.00		130.49
TOTAL FOR YR	0.00		0.00

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX TOTAL

PROBLEMS	#1PUMP DOWN 3\25\00 J H WRIGHT REBUILD		COST	$1.857.00	$1.857.00
QUA 2	CHANGED OUT A&B 100-CA-5D10 CONTACTOR		COST	$202.56	$405.12
QUA2	CHANGED OUY A&B 193-A2K3 OVER LOAD RELAY		COST	$69.63	$139.00
qua 1	changed out #2pump on 6/29/2003	installed new pump			$4,778.10

PO 004900

LIFT STATION	22 AVE HEIGHTS			INSTALLED	12\94	3/1/03
LOCATION	CAUSEYVILLE ROAD					
MAKE	BARNES	MODEL	6SE36034L			
SPECIFICS	230 VOLT 3\PH FLA.	H\P 36	TDH 110	GPM 250		
VENDOR	J H WRIGHT					
CONTROLLER	CONTROLS OF HOUSTON					

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	110.81	110.81
11/1/00	0.00	110.81
12/1/00	0.00	110.81
1/1/00	0.00	110.81
2/1/00	0.00	110.81
3/1/00	0.00	110.81
4/1/00	0.00	110.81
5/1/00	0.00	110.81
6/1/00	0.00	110.81
7/1/00	0.00	110.81
8/1/00	0.00	110.81
9/1/00	0.00	110.81
	0.00	110.81
TOTAL FOR YR	0.00	110.81

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

LIFT STATION	PAN CAKE FIELD				INSTALLED	05\96	
LOCATION	19TH STREET						
MAKE	CHICAGO		MODEL	4408	ABS	J 3OD-4MS	6 H/P
SPECIFICS	230 VOLT 3\PH	.FLA.19	H\P	TDH30	GPM 100		
VENDOR	J H WRIGHT						
CONTROLLER	CONTROL SYSTEMS INC,						

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	17.86		17.86
11/1/00	0.00		17.86
12/1/00	0.00		17.86
1/1/00	0.00		17.86
2/1/00	0.00		17.86
3/1/00	0.00		17.86
4/1/00	0.00		17.86
5/1/00	0.00		17.86
6/1/00	0.00		17.86
7/1/00	0.00		17.86
8/1/00	0.00		17.86
9/1/00	0.00		17.86
	0.00		17.86
TOTAL FOR YR	0.00		17.86

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

13 FLA

LIFT STATION	31 AVE SOUTH		INSTALLED	12\10\92
LOCATION	31 AVE SOUTH			
MAKE	GOULD	MODEL	3888	
SPECIFICS	230 VOLT 3 \PH 5 \HP	FLA 17	TDH 50	GPM 100
VENDOR	GENERL PUMP			
CONTROLLER	CONTROL SYSTEMS INC.			

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	10.98	10.98
11/1/00	0.00	10.98
12/1/00	0.00	10.98
1/1/00	0.00	10.98
2/1/00	0.00	10.98
3/1/00	0.00	10.98
4/1/00	0.00	10.98
5/1/00	0.00	10.98
6/1/00	0.00	10.98
7/1/00	0.00	10.98
8/1/00	0.00	10.98
9/1/00	0.00	10.98
	0.00	10.98
TOTAL FOR YR	0.00	10.98

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

LIFT STATION	LA LA		INSTALLED	O5\19\93
LOCATION	900 NORTH FRONTAGE ROAD			
MAKE	BARNES	MODEL 4SE2824L		
SPECIFICS	220 VOLT S\P 2.8 H\P FLA.19 TDH. 15 GPM 50			
VENDOR	J H WRIGHT			
CONTROLLER	CONTROLS OF HOUSTON			

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	10.56	10.56
11/1/00	0.00	10.56
12/1/00	0.00	10.56
1/1/00	0.00	10.56
2/1/00	0.00	10.56
3/1/00	0.00	10.56
4/1/00	0.00	10.56
5/1/00	0.00	10.56
6/1/00	0.00	10.56
7/1/00	0.00	10.56
8/1/00	0.00	10.56
9/1/00	0.00	10.56
	0.00	10.56
TOTAL FOR YR	0.00	10.56

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PROBLEMS

1/19/02	1	600 VOLT CONTACTOR	$160.15
	1	OVERLOAD RELAY	$60.14
	10	20 AMP 240 VOLT FUSES	$9.30
repair pump t industrial electricial moters/ #2 pump			$723.00

LIFT STATION	OLD 80 #1 STATION	INSTALLED	03\05\99
LOCATION	6900 OLD 80 WEST		
MAKE	PUMPEX	MODEL	K156F-CD5270
SPECIFICS	480 VOLT 3\PH 18 H\P TDH 35 GPM 1050		
VENDOR	J H WRIGHT		
CONTROLLER	CONTROL SYSTEMS INC		

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	105.68	105.68
11/1/00	0.00	105.68
12/1/00	0.00	105.68
1/1/00	0.00	105.68
2/1/00	0.00	105.68
3/1/00	0.00	105.68
4/1/00	0.00	105.68
5/1/00	0.00	105.68
6/1/00	0.00	105.68
7/1/00	0.00	105.68
8/1/00	0.00	105.68
9/1/00	0.00	105.68
	0.00	105.68
TOTAL FOR YR	0.00	105.68

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXX

LIFT STATION	WIND MILL DRIVE			INSTALLED	11\11\98
LOCATION	WIND MILL DRIVE				
MAKE	GORMAN-RUPP	MODEL	JSV4E60-E17		
SPECIFICS	230 VOLT 3\PH 17 \H\P	FLA 54	TDH 70	GPM 200	
VENDOR	DELTA PROCESS EQUIPMENT				
CONTROLLER	CONTROL SYSTEMS INC,				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	20.37	20.37
11/1/00	0.00	20.37
12/1/00	0.00	20.37
1/1/00	0.00	20.37
2/1/00	0.00	20.37
3/1/00	0.00	20.37
4/1/00	0.00	20.37
5/1/00	0.00	20.37
6/1/00	0.00	20.37
7/1/00	0.00	20.37
8/1/00	0.00	20.37
9/1/00	0.00	20.37
	0.00	20.37
TOTAL FOR YR	0.00	20.37

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LIFT STATION	8TH PLACE			INSTALLED	8/1/00
LOCATION	WINDMILL SUB DIVISON				
MAKE	BARNES	MODEL	4SE2824L		
SPECIFICS	220 VOLT S/P 2.8 H/P	110 GPM	24 TDH		
VENDOR	J.H. WRIGHT				
CONTROLLER	CONTROL SYSTEMS INC				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	13.16	13.16
11/1/00	0.00	13.16
12/1/00	0.00	13.16
1/1/00	0.00	13.16
2/1/00	0.00	13.16
3/1/00	0.00	13.16
4/1/00	0.00	13.16
5/1/00	0.00	13.16
6/1/00	0.00	13.16
7/1/00	0.00	13.16
8/1/00	0.00	13.16
9/1/00	0.00	13.16
	0.00	13.16
TOTAL FOR YR	0.00	13.16

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BONITA LAKES BOOSTER water INSTALLED
LOCATION BONITA LAKES DRIVE
MAKE MODEL
SPECIFICS
VENDOR
CONTROLLER

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	167.61	167.61
11/1/00	0.00	167.61
12/1/00	0.00	167.61
1/1/00	0.00	167.61
2/1/00	0.00	167.61
3/1/00	0.00	167.61
4/1/00	0.00	167.61
5/1/00	0.00	167.61
6/1/00	0.00	167.61
7/1/00	0.00	167.61
8/1/00	0.00	167.61
9/1/00	0.00	167.61
	0.00	167.61
TOTAL FOR YR	0.00	167.61

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LIFT STATION	TOMMY WEBB DRIVE			INSTALLED	07\95
LOCATION	TOMMY WEBB DRIVE				
MAKE	GOULD	MODEL	3SD12F3DA		
SPECIFICS	230 VOLT 3\PH FLA.10	TDH30	GPM 100		
VENDOR	GENERL PUMP				
CONTROLLER	CONTROL SYSTEM INC.				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	21.37	21.37
11/1/00	0.00	21.37
12/1/00	0.00	21.37
1/1/00	0.00	21.37
2/1/00	0.00	21.37
3/1/00	0.00	21.37
4/1/00	0.00	21.37
5/1/00	0.00	21.37
6/1/00	0.00	21.37
7/1/00	0.00	21.37
8/1/00	0.00	21.37
9/1/00	0.00	21.37
	0.00	21.37
TOTAL FOR YR	0.00	21.37

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PROBLEMS	REPLACE DC101 BOARD	2\13\00	COST	$247.00

LIFT STATION	AIR PORT LIFT STATION		INSTALLED	1\15\96
LOCATION	HIGH WAY 11 SOUTH			
MAKE	BARNES	MODEL 4SE2894L		
SPECIFICS	230 VOLT 3 \PH FLA 10	TDH 25 GPM 150		
VENDOR	J H WRIGHT			
CONTROLLER	CONTROLS OF HOUSTON			

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	11.23	11.23
11/1/00	0.00	11.23
12/1/00	0.00	11.23
1/1/00	0.00	11.23
2/1/00	0.00	11.23
3/1/00	0.00	11.23
4/1/00	0.00	11.23
5/1/00	0.00	11.23
6/1/00	0.00	11.23
7/1/00	0.00	11.23
8/1/00	0.00	11.23
9/1/00	0.00	11.23
	0.00	11.23
TOTAL FOR YR	0.00	11.23

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LIFT STATION	CHANDLER ROAD #1		INSTALLED 04\92
LOCATION	CHANDLER ROAD AND BOUNDS ROAD		
MAKE	BARNES	MODEL 4SE14341	
SPECIFICS	230 VOLT 3 \PH FLA.5 TDH 19 GPM 100		
VENDOR	J H WRIGHT		
CONTROLLER	CONTROL SYSTEMS INC.		

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	13.16		13.16
11/1/00	0.00		13.16
12/1/00	0.00		13.16
1/1/00	0.00		13.16
2/1/00	0.00		13.16
3/1/00	0.00		13.16
4/1/00	0.00		13.16
5/1/00	0.00		13.16
6/1/00	0.00		13.16
7/1/00	0.00		13.16
8/1/00	0.00		13.16
9/1/00	0.00		13.16
	0.00		13.16
TOTAL FOR YR	0.00		13.16

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LIFT STATION	NORTH WOOD COMMON			INSTALLED	1995	2005
LOCATION	NORTH WOOD COMMON CIR.					
MAKE	BARNES	MODEL	4SE15034L		SER-T1011967	
SPECIFICS	230 VOLT 3\PH TDH 75	GPM 250	#1 10 H\P	#2 15 H\P INSTALLED 02\95		
VENDOR	GULF STATES ENG \ J H WRIGHT					
CONTROLLER	FLYGT					

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	37.63	37.63
11/1/00	0.00	37.63
12/1/00	0.00	37.63
1/1/00	0.00	37.63
2/1/00	0.00	37.63
3/1/00	0.00	37.63
4/1/00	0.00	37.63
5/1/00	0.00	37.63
6/1/00	0.00	37.63
7/1/00	0.00	37.63
8/1/00	0.00	37.63
9/1/00	0.00	37.63
		37.63
TOTAL FOR YR		

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LIFT STATION	NORTH WOOD EAST				INSTALLED	01\28\87	REBUILT
LOCATION	10 AVE						
MAKE	PUMPEX	MODEL	K83F-VB-1160			K83 W1313-2	
SPECIFICS	230 V 3 PHASE	6 HP	18 AMPS	TDH 73	GPM 100		
VENDOR	GULF STATES ENG						
CONTROLLER	FLYGT WITH	CONTROL SYSTEMS BOARD			WITH BENSHAW VFD		

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	20.70		20.70
11/1/00	0.00		20.70
12/1/00	0.00		20.70
1/1/00	0.00		20.70
2/1/00	0.00		20.70
3/1/00	0.00		20.70
4/1/00	0.00		20.70
5/1/00	0.00		20.70
6/1/00	0.00		20.70
7/1/00	0.00		20.70
8/1/00	0.00		20.70
9/1/00	0.00		20.70
	0.00		20.70
TOTAL FOR YR	0.00		20.70

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LIFT STATION	LINDLEY ROAD	1986 INSTALLED				INSTALLED	#1 2/05	#2	9/04
LOCATION	LINDLEY ROAD								
MAKE	ABS		MODEL		EJ50D-4MS		BARNES	MOD4SEHL 7	
SPECIFICS	230 /3ph /5hp	H\P	13	F.L.A.	tdh 30	gpm 375	230 VOLT 3PHASE	7.5 H/	
VENDOR	HYDRA SERVICE						DELTA PROCESS		
CONTROLLER	FLYGT	CP3102							

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	18.52		18.52
11/1/00	0.00		18.52
12/1/00	0.00		18.52
1/1/00	0.00		18.52
2/1/00	0.00		18.52
3/1/00	0.00		18.52
4/1/00	0.00		18.52
5/1/00	0.00		18.52
6/1/00	0.00		18.52
7/1/00	0.00		18.52
8/1/00	0.00		18.52
9/1/00	0.00		18.52
	0.00		18.52
TOTAL FOR YR	0.00		18.52

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'.5
'P SER #1 000501 #2

LIFT STATION	NORTH EAST SOFT BALL				INSTALLED	1994
LOCATION	NEWELL ROAD					
MAKE	BARNES		MODEL	4SE15034L		
SPECIFICS	230 VOLT 3\PH	15 H\P	FLA.33	TDH 80	GPM 100	
VENDOR	J H WRIGHT					
CONTROLLER	CONTROLS OF HOUSTON					

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	20.20	20.20
11/1/00	0.00	20.20
12/1/00	0.00	20.20
1/1/00	0.00	20.20
2/1/00	0.00	20.20
3/1/00	0.00	20.20
4/1/00	0.00	20.20
5/1/00	0.00	20.20
6/1/00	0.00	20.20
7/1/00	0.00	20.20
8/1/00	0.00	20.20
9/1/00	0.00	20.20
	0.00	20.20
TOTAL FOR YR	0.00	20.20

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LIFT STATION	NEWELL ROAD2	INSTALLED	1987	10/2/05
LOCATION	NEWELL ROAD			

PUMP NO. 1	GOULD		
MAKE		MODEL	
SPECIFICS			
VENDOR	GENERAL PUMP		

PUMP NO. 2	BARNES		
MAKE	BARNES	MODEL	4SE7534L
SPECIFICS	55 TDH/250GPM	230 VOLT 3PH	
VENDOR	J H WRIGHT		

CONTROLLER GENERAL PUMP

DATE / 01-02	POWER BILL	TOTAL YTD
10/1/00	0.00	0.00
11/1/00	0.00	0.00
12/1/00	0.00	0.00
1/1/00	0.00	0.00
2/1/00	0.00	0.00
3/1/00	0.00	0.00
4/1/00	0.00	0.00
5/1/00	0.00	0.00
6/1/00	0.00	0.00
7/1/00	0.00	0.00
8/1/00	0.00	0.00
9/1/00	0.00	0.00
	0.00	0.00
TOTAL FOR YR	0.00	0.00

LIFT STATION	NEWELL ROAD #3			INSTALLED	08\94
LOCATION	NEWELL ROAD				
MAKE	BARNES	MODEL	4SE15034HL		
SPECIFICS	230 VOLT 3\PH H\P 15	TDH 75	GPM 100		
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

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DATE /99-00		POWER BILL	TOTAL YTD
10/1/00	64.28		64.28
11/1/00	0.00		64.28
12/1/00	0.00		64.28
1/1/00	0.00		64.28
2/1/00	0.00		64.28
3/1/00	0.00		64.28
4/1/00	0.00		64.28
5/1/00	0.00		64.28
6/1/00	0.00		64.28
7/1/00	0.00		64.28
8/1/00	0.00		64.28
9/1/00	0.00		64.28
	0.00		64.28
TOTAL FOR YR	0.00		64.28

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LIFT STATION	11 AVE				INSTALLED	11/1/04
LOCATION	11 AVE & WINDMILL DRIVE					
MAKE	PUMPEX		MODEL			
SPECIFICS	220 VOLT S\P	FLA 17	TDH50	GPM 100		
VENDOR	J.H.WRIGHT					
CONTROLLER	CONTROL SYSTEM INC					

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DATE /00-01		POWER BILL	TOTAL YTD
10/1/00	18.36		18.36
11/1/00	0.00		18.36
12/1/00	0.00		18.36
1/1/00	0.00		18.36
2/1/00	0.00		18.36
3/1/00	0.00		18.36
4/1/00	0.00		18.36
5/1/00	0.00		18.36
6/1/00	0.00		18.36
7/1/00	0.00		18.36
8/1/00	0.00		18.36
9/1/00	0.00		18.36
	0.00		18.36
TOTAL FOR YR	0.00		18.36

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11/24/04 ORDERED TWO NEW CHECK VALVES
INSTALL P0RTABLE LIFT STATION HOOK UP

LIFT STATION	NORTH WEST SCHOOL			INSTALLED	12\94
LOCATION	35 STREET				
MAKE	BARNES	MODEL	4SE379L4		
SPECIFICS	230 VOLT 3 \PH 3.7 H\P	FLA.12	TDH 20	GPM 100	
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	23.64	23.64
11/1/00	0.00	23.64
12/1/00	0.00	23.64
1/1/00	0.00	23.64
2/1/00	0.00	23.64
3/1/00	0.00	23.64
4/1/00	0.00	23.64
5/1/00	0.00	23.64
6/1/00	0.00	23.64
7/1/00	0.00	23.64
8/1/00	0.00	23.64
9/1/00	0.00	23.64
	0.00	23.64
TOTAL FOR YR	0.00	23.64

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problem			
feb/12/2002	no#2 pump down	repair work done by j.h.wright	$888.00

LIFT STATION	27 PLACE			INSTALLED	01\16\96
LOCATION	27 STREET				
MAKE	BARNES	MODEL	4SE2894L		
SPECIFICS	230 VOLT 3\PH H\P 2.8	FLA. 12	TDH 20	GPM 100	
VENDOR	J H WRIGHT				
CONTROLLER	CONTROLS OF HOUSTON				

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	13.99	13.99
11/1/00	0.00	13.99
12/1/00	0.00	13.99
1/1/00	0.00	13.99
2/1/00	0.00	13.99
3/1/00	0.00	13.99
4/1/00	0.00	13.99
5/1/00	0.00	13.99
6/1/00	0.00	13.99
7/1/00	0.00	13.99
8/1/00	0.00	13.99
9/1/00	0.00	13.99
	0.00	13.99
TOTAL FOR YR	0.00	13.99

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LIFT STATION	MCC				INSTALLED	3\29/2005		
LOCATION	1435 COLLAGE DRIVE							
MAKE	ABS	ABS	MOD	EJ30D-4MS		EJ30D-4MS		
SPECIFICS	230 VOLT 3 \PH	FLA.	3 H/P	TDH 20	GPM 100	SER,	#1	#2 000501
VENDOR	HYDRA SERVICES							
CONTROLLER	CONTROL SYSTEMS INC,							

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DATE /00-01	POWER BILL	TOTAL YTD
10/1/00	35.96	35.96
11/1/00	0.00	35.96
12/1/00	0.00	35.96
1/1/00	0.00	35.96
2/1/00	0.00	35.96
3/1/00	0.00	35.96
4/1/00	0.00	35.96
5/1/00	0.00	35.96
6/1/00	0.00	35.96
7/1/00	0.00	35.96
8/1/00	0.00	35.96
9/1/00	0.00	35.96
	0.00	35.96
TOTAL FOR YR	0.00	35.96

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PROBLEMS DATE

LIFT STATION	LOCKHART TRAILER PARK ROAD				INSTALLED	11/20/03
LOCATION	LOCKHART TRAILOR PARK ROAD					
MAKE	PUMPEX		MODEL	K107F-CB-3360		
SPECIFICS	6" 480 VOLTS 3PHASE 98 H/P		FLA 115		195 tdh	1200 gpm
VENDOR	J H WRIGHT					
CONTROLLER	CSI					

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx
DATE / 01-02		POWER BILL			TOTAL YTD	
10/1/00	0.00				0.00	
11/1/00	0.00				0.00	
12/1/00	0.00				0.00	
1/1/00	0.00				0.00	
2/1/00	0.00				0.00	
3/1/00	0.00				0.00	
4/1/00	0.00				0.00	
5/1/00	0.00				0.00	
6/1/00	0.00				0.00	
7/1/00	0.00				0.00	
8/1/00	0.00				0.00	
9/1/00	0.00				0.00	
	0.00				0.00	
TOTAL FOR YR	0.00				0.00	

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx

LIFT STATION	N.A.S. AIR STATION				INSTALLED	11/20 2003
LOCATION	N.A.S. GATES					
MAKE	PUMPEX		MODEL	K107F-CB-3360		
SPECIFICS	6" 480 VOLT 3 PHASE	FLA. 115		195 tdh	1200 gpm	
VENDOR	J.H.WRIGHT					
CONTROLLER	C.S.I.					

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx
DATE / 01-02		POWER BILL			TOTAL YTD	
10/1/00	0.00				0.00	
11/1/00	0.00				0.00	
12/1/00	0.00				0.00	
1/1/00	0.00				0.00	
2/1/00	0.00				0.00	
3/1/00	0.00				0.00	
4/1/00	0.00				0.00	
5/1/00	0.00				0.00	
6/1/00	0.00				0.00	
7/1/00	0.00				0.00	
8/1/00	0.00				0.00	
9/1/00	0.00				0.00	
	0.00				0.00	
TOTAL FOR YR	0.00				0.00	

xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxxxx	xxxxxxxxx

LIFT STATION	PIPPIN ROAD				INSTALLED	7/25/02
LOCATION	BONITA DRIVE & PIPPIN ROAD					
MAKE	PUMPEX		MODEL	K86F-VE-1190		
SPECIFICS	26 H/P	3 PHASE	480 VOLT		TDH 135	GPM300
VENDOR	J.H. WRIGHT & ASS					
CONTROLLER	CSI JACKSON MS.					

Appendix C
Updated Pump Station Inventory

Appendix C: Pump Station Inventory
Wastewater Master Plan
City of Meridian, MS

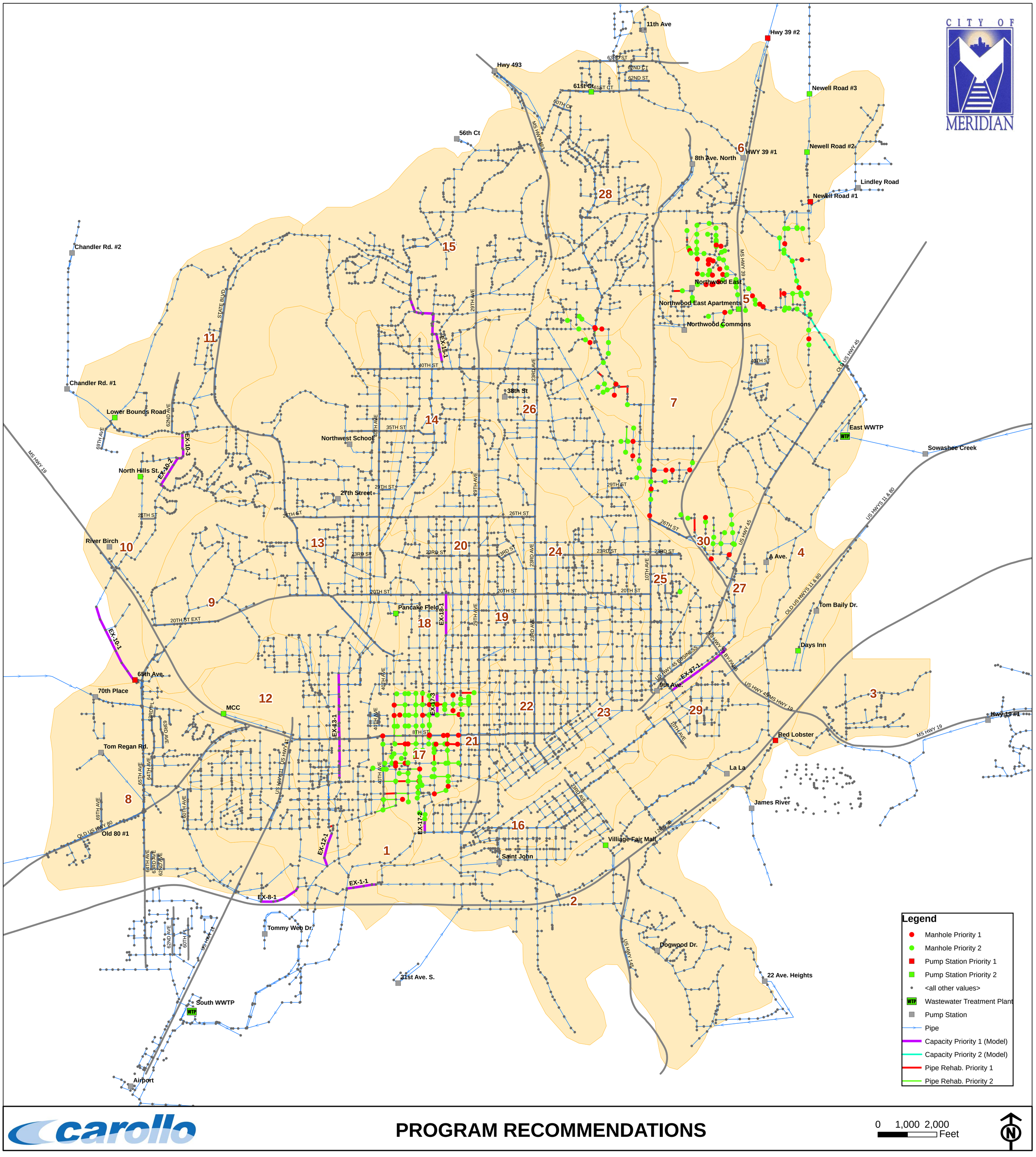
PS No.	PS Name	Location Description	City's File Ref	GIS LS Ref	Pump #1 GPM	Pump #1 TDH	Pump #1 HP	Pump #1 Make	Pump #1 Model	Pump #1 Discharge Size (in)	Pump #1 Installation Date	Pump #1 Controller	Pump #1 Voltage	Pump #1 Phase	Pump #1 FLA	Pump #1 Vendor	Pump #1 Ser. #	Pump #1 Note	Pump #2 GPM	Pump #2 TDH	Pump #2 HP	Pump #2 Make	Pump #2 Model	Pump #2 Discharge Size	Pump #2 Installation Date	Pump #2 Controller	Pump #2 Voltage	Pump #2 Phase	Pump #2 FLA	Pump #2 Vendor	Pump #2 Ser. #	Pump #2 Note
1	8th Ave. North	8th Ave.	M41	LS-BT	120	102	10	Pumpex	K87-X210TY		3/1/2006	CSI	230	3	37	General Pump	61-26398	ID NO#P21G2701H-YP														
2	8th Place	Windmill Sub Division	M15	LS-CG							1/1/2007								110	24	2.8	Barnes	4SE2824L		8/1/2000	CSI	220	1		J.H. Wright & Assoc.		
3	9th Ave.	5th St. & 9th Ave. (Near Front St. and 10th Ave)	M25	LS-BS	150	18	2.8	Barnes	4SE2834L		9/1/1993	Controls of Houston	230	3	18	J.H. Wright & Assoc.					1.5	Gould	4SD52F3DA		9/1/2004		230	3				
4	10th Ave. North	Windmill Sub Division	M49	LS-CH	80	20	2.8	Barnes	1	4	1/1/2003	CSI Jackson ms	230	1	12.6	J.H. Wright & Assoc.	748476														753304	
5	11 Ave	11 Ave. & Windmill Dr.	M04	LS-CJ	100	50	4.5	Pumpex	K83-NF-VB-1160		11/1/2004	CSI	220	1	17	J.H. Wright & Assoc.		11/24/04 Ordered two new check valves, install portable lift station hook up														
6	22 Ave. Heights	Causeyville Rd.	M21	LS-BY	250	110	36	Barnes	6SE36034L		3/1/2003	Controls of Houston	230	3		J.H. Wright & Assoc.																
7	27th Place	27th Street	M02	LS-BW	100	20	2.8	Barnes	4SE2894L		1/16/1996	Controls of Houston	230			J.H. Wright & Assoc.																
8	31 Ave. South	31 Ave. South	M19	LS-BZ	100	50	5	Gould	3888		12/10/1992	CSI	230	3	17	General Pump																
9	38th St.	38th St. & 24th Ave.	M48	LS-BJ	150	34		Pumpex	K80F-CB-3180		11/1/2000	CSI	230	1		J.H. Wright & Assoc.		Ronk add a phase														
10	56th Court	56th Court and Dogwood Hills	M39	LS-BV	50	25	0.75	Barnes	4SE2024L		9/12/1996	Controls of Houston	220	1	10	J.H. Wright & Assoc.																
11	61st Court	61 Court	M37	LS-BU	75	55					1/1/2003	E.G. Gulf State Eng.	230	3		J.H. Wright & Assoc.																
12	65th Ave.	65th Ave.	M43	LS-AT	1200	35	25	Yeoman	S56415		1/1/2006	CSI	230	3		General Pump			1200	35	24	Pumpex	K106-FCC3245		1/1/1994					J.H. Wright & Assoc.		
13	70th Place	Old 8th St.Rd.	M44	LS-AH	200	35		Gould	4SD12J1AA		1/19/1996	CSI	230	3	16.6	General Pump		12/4/2000 phase monitor & 8 pin socket														
14	A Ave.	2213 A Ave.	M27	LS-BX	250	35	3	Reliance	P17G2705F		1/1/1984	Watch Pump	230	3		Menge Pump & Power		Install Portable Lift Station hookup: 1-4" MJ Valve $157, 8-4" Set ring kits $69, 1-4" dip				Barnes	4SE5094L		3/10/2000							3/10/2000 Pump 2 replaced $1478
15	Air Port Lift Station	Highway 11 South	M12	LS-AA	150	25		Barnes	4SE2894L		1/15/1996	Controls of Houston	230	3	10	J.H. Wright & Assoc.			150	25		Barnes	4SE2894L										
16	Chandler Rd. #1	Chandler Rd. & Bounds Rd.	M11	LS-AR	100	19		Barnes	4SE14341		4/1/1992	CSI	230	3	5	J.H. Wright & Assoc.																
17	Chandler Road #2	North End of Chandler Rd		LS-AS	100	37	3.7	Barnes	4SE3724L		6/1/1992	Controls of Houston	240	1																		
18	Cotton Gin Rd.	Cotton Gin Rd. & Red Baron Rd. (flows to East WWTP)	M47	n/a	1600	90	56	Pumpex	K154-FC-D3290	6	11/20/2003	CSI	480	3	64.1	J.H. Wright & Assoc.																
19	Days Inn	Highway 80 East	M24	LS-AQ	150	18	2.8	Barnes	4SE2834L		10/1/1993	unknown	230	3		J.H. Wright & Assoc.		12/9/2000 replaced #1 starter & thermo overload							12/11/2000							
20	Dogwood Dr.	Dogwood Dr.	M33	LS-BR	275	25	11.3	Barnes	4SE11334L		6/17/1905	Controls of Houston	230	3	28	J.H. Wright & Assoc.																
21	Highway 39 #1	Highway 39 North	M36	LS-BP	1200	75	36	Pumpex	K152F-CA-3275		6/25/2000	CSI	480	3		J.H. Wright & Assoc.		11/24/2000 repair #1 pump; replace 6" ck valve, 2x4 ft flange nipple, 8 flange assem	1200	75	40	Barnes	6SE48044HL		7/10/1992		480	3				11/24/2000 repair #2 pump $1760
22	Highway 39 #2	Highway 39 North	M35	LS-BO	250	143	26	Pumpex	K86F-VC-1190		11/28/1998	CSI	230	3	73	J.H. Wright & Assoc.																
23	Hwy 19 S #1	890 Hwy 19 S, (near Mitchum Rd. & Hwy 19 S)		LS-AO	325	70	13.5	Pumpex	K102F-CA3255		1/1/2000	CSI	480	3																		
24	Hwy 19 S #2	992 Hwy 19 S, (near Bonita Dr & Hwy 19 S)		LS-BH	324	70	13.5	Pumpex	K102F-CA3255		1/1/2000	CSI	480	3																		
25	Hwy 493	6210 Hwy 493, near a new Church, 0.6miles north of 56th Ct & Hwy 493		LS-BI	140	80	23	Flygt	CLP3152		1/1/1985	Flygt	230	3																		
26	James River	Virginia Dr.	M31	LS-BM	100	30	11.3	Barnes	4SE11334L		8/1/1994	Controls of Houston	230	3		J.H. Wright & Assoc.																
27	Knight Parker Rd.	Knight parker rd & Old US HWYS 11 & 80	M54	LS-CB			10	Pumpex	K100F-CA-3220		1/1/2006	CSI	480	3																		
28	La La	900 Frontage Rd.	M18	LS-BL	50	15	2.8	Barnes	4SE2824L		5/19/1993	Controls of Houston	220	1	19	J.H. Wright & Assoc.		1/19/2002 1-600V contactor $160, 1-Overload Relay $60, 10-20Amp fuses $9,														
29	Lindley Rd.	Lindley Rd.	M08	LS-BK	375	30	5	ABS	EJ50D-4MS		2/1/2005	FLYGT	230	3	13	Hydra Services	O00501				7.5	Barnes	4SEHL-7.5		9/1/2004		230	3		Delta Process		
30	Lockhart Trailer Park Rd.	Lockhart Trailer Park Rd. (Flows to Cottin Gin Rd LS)	E9	n/a	1200	195	98	Pumpex	K107F-CB-3360	6	11/20/2003	CSI	480	3	115	J.H. Wright & Assoc.																
31	Lovers Ln.	Old 80th St.Rd. & Lovers Ln.	M52	LS-AG	192	40	6.5	Pumpex	K102-CA3200	4	1/1/2007	FLYGT	230	3		J.H. Wright & Assoc.			192	40	6.5	Pumpex	K102-CA3200	4	1/1/2005		230	3		J.H. Wright & Assoc.		
32	Lower Bounds Rd.	Chandler Rd.	M42	LS-AL	150	150	18	Pumpex	K86-VE1190		1/22/2004	Controls of Houston	230	3		J.H. Wright & Assoc.		10/4/2000 replaced #1 pump with rebuild from Hwy 39#1 Lift station $3100, 1/22/2004 replaced #1 pump with pumpex $5870				Myers			9/1/2004					Gulf Coast Pumps		
33	MCC	1435 College Drive	M01	LS-AK	100	20	3	ABS	EJ30D-4MS		3/29/2005	CSI	230	3		Hydra Services						ABS	EJ30D-4MS								O00501	
34	N.A.S. Air Station	N.A.S. GATES (flows to Lockhart Trailer Park Rd. LS)	E8	n/a	1200	195	98	Pumpex	K107F-CB-3360	6	11/20/2003	CSI	480	3	115	J.H. Wright & Assoc.																
35	Newell Rd. #1	Newell Rd.	M40	LS-BG	275	75	15	ABS	AFP1049.3M90/4		10/1/1994	Controls of Houston	230	3		J.H. Wright & Assoc.																
36	Newell Rd. #2	Newell Rd.	M06	LS-AI				Gould			1/1/1987	General Pump				General Pump			250	55		Barnes	4SE7534L		10/2/2005		230	3		J.H. Wright & Assoc.		
37	Newell Rd. #3	Newell Rd.	M05	LS-BF	100	75	15	Barnes	4SE15034HL		8/1/1994	Controls of Houston	230	3		J.H. Wright & Assoc.																
38	North East Softball	Newell Rd.	M07	LS-CE	100	80	15	Barnes	4SE15034L		1/1/1994	Controls of Houston	230	3	33	J.H. Wright & Assoc.																
39	North Hills St.	6520 North Hills St.	M34	LS-AE	45	20	1.5	Barnes	4SE1424L		5/1/1994	Controls of Houston	220	1	8	J.H. Wright & Assoc.																
40	North West School	35 Street	M03	LS-BE	100	20	3.7	Barnes	4SE379L4		12/1/1994	Controls of Houston	230	3	12	J.H. Wright & Assoc.																
40	North Wood Common	North Wood Common Cir.	M10	LS-BD	250	75	10	Barnes	4SE15034L		1/1/2005	FLYGT	230	3		Gulf States Eng	T1011967				15				2/1/1995					J.H. Wright & Assoc.		
42	North Wood East	10 Ave.	M09	LS-BC	100	73	6	Pumpex	K83F-VB-1160		1/28/1987	FLYGT	230	3	18	Gulf States Eng	K83 W1313-2	Rebuilt 9/20/2005														
43	North Wood East Apt.	Highway 39 North	M38	LS-BB	150	30	2.8	Barnes	4SE2854IMS		1/1/1993	Controls of Houston	230	3	10	J.H. Wright & Assoc.					5	ABS	EJ-50DL4MS		4/1/2005		230	3				
44	Old 80 #1 Station	6900 Old 80 West	M17	LS-AF	1050	35	18	Pumpex	K156F-CD5270		3/5/1999	CSI	480	3		J.H. Wright & Assoc.																
45	Old 80 #2 Station	west of town near Railroad Tracks, near I-20 and Old US Hwy 80		LS-AW	950	87	48	Pumpex	K152-CA3278		3/1/1999	CSI	480	3																		
46	Old 80 #3 Station	west of town by Prison Gates, near I-20 and Old US Hwy 80		LS-AV	800	112	48	Pumpex	K152F-CA3297		3/1/1999	CSI	480	3					800	112	48	Pumpex	K152F-CA3297		3/1/1999	CSI	480	3				
47	Old 80 East Industrial Park	On US Hwys 11 & 80 between Us Hwy 45 and W Malone Ranch Rd, Inside Industrial Park		LS-CC			3	Pumpex	K100F-CB-3180		1/1/2006	CSI	480	3																		
48	Pancake Field	19th St.	M20	LS-BA	100	30	6	CH	J30D-4MS		1/1/2005	CSI	230	3	19	J.H. Wright & Assoc.			100	30	6	ABS	EJ30D-4MS		5/1/1996	CSI	230	3	19	J.H. Wright & Assoc.		
49	Pippins Rd.	Bonita Dr.& Pippin Rd	E7	LS-CD	300	135	26	Pumpex	K86F-VE-1190		7/25/2002	CSI Jackson MS.	480	3		J.H. Wright & Assoc.																

Appendix C: Pump Station Inventory
Wastewater Master Plan
City of Meridian, MS

PS No.	PS Name	Location Description	City's File Ref	GIS LS Ref	Pump #1 GPM	Pump #1 TDH	Pump #1 HP	Pump #1 Make	Pump #1 Model	Pump #1 Discharge Size (in)	Pump #1 Installation Date	Pump #1 Controller	Pump #1 Voltage	Pump #1 Phase	Pump #1 FLA	Pump #1 Vendor	Pump #1 Ser. #	Pump #1 Note	Pump #2 GPM	Pump #2 TDH	Pump #2 HP	Pump #2 Make	Pump #2 Model	Pump #2 Discharge Size	Pump #2 Installation Date	Pump #2 Controller	Pump #2 Voltage	Pump #2 Phase	Pump #2 FLA	Pump #2 Vendor	Pump #2 Ser. #	Pump #2 Note
50	Red Lobster	Bonita Dr., South Frontage Road	M22	LS-AN	1000	55	24	ABS	AFP1547.2ME185/4		11/1/2005	CSI	230	3		J.H. Wright & Assoc.		3/25/2000 Pump 1 rebuilt by JH Wright PO 004900 ($1857), 2 contactors replaced: A&B 100-CA-5D10 ($405), 2 overload relays replaced A&B 193-A2K3 ($139)							6/9/2003							6/29/2003 new pump $4778
51	River Birch LS	Highway 19 North & 67 Ave. Loop (behind Colonial Storage on River Birch Drive)	M53	LS-CM				Myers			12/1/2005	CSI	230	3																		
52	South Industrial Park	Highway 11 South	M46	LS-AP	750	30	15	Barnes	4SE15034L		11/4/2004	CSI	230	3	42	J.H. Wright & Assoc.			750	30	15	Barnes	4SE15034L		1/1/2007							
53	Sowashee Creek	on Old US Hwy 11 & 80 near WMOX radio Station	M56	LS-CA			10	Pumpex	K100F-CA-3222		1/1/2006	CSI	480	3																		
54	St. John	at the end of 27th Ave., between St John St. and Sowashee Creek?		LS-AZ	100	25	1.5	ABS	EJ30D4MS		1/1/2007	E.E.E	230	3																		
55	Sweet Gum Bottom Rd.			LS-CN																												
56	The Commons	North of Windmill Dr. at Old Poplar Springs Dr and 69th CT.	M55	LS-CI	100	64	4.7		K83NF-VB-1143		1/1/2005	CSI	220	1																		
57	Tom Bailey Dr.	Highway 11 & 80	M26	LS-AB	300	25	9.4	ABS	EJ3OD-AMS		12/1/2005	FLYGT	230	3		Gulf States Eng						Barnes	4SE1534		1/1/2000					J.H. Wright & Assoc.		
58	Tom Regan Rd.	65th Ave.	M45	LS-AD	100	30		Barnes	4SE4534L		4/1/1996	CSI	230	3	18	J.H. Wright & Assoc.			100	30		Barnes	4SE4534L				230	3				
59	Tommy Webb Dr.	Tommy Webb Dr.	M13	LS-CK	100	30		Barnes	3SD12F3DA		7/1/1995	CSI	230	3	10	General Pump		2/13/00 Replaced DC101 Board $247	100	30		Barnes	3SD12F3DA									
60	Village Fair Mall	North Frontage Rd.	M28	LS-CL	100	25		ABS	EJ30D4MS		1/1/2007	Engineered Environmental Equip.	230	3		Engineered Environmental Equip.			100	25		ABS	EJ30D4MS		1/1/2007	Engineered Environmental Equip.	230	3		Engineered Environmental Equip.		
61	Windmill Dr.	Windmill Dr.	M16	LS-CF	200	70	17	Gorman-Rupp	JSV4E60-E17		11/11/1998	CSI	230	3	54	Delta Process Equip.																

Appendix D
Detailed Results of Model Simulation Runs

Appendix E
Full Scale (24” x 36”) Maps of Model Simulations



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PROGRAM RECOMMENDATIONS

0 1,000 2,000 Feet

N

Appendix F
Wastewater Collection System Rehabilitation Program

Wastewater Collection System Program Summary	Priority 1 Preliminary Cost	Priority 2 Preliminary Cost
Basin 5		
Rehabilitation		
Manhole Rehabilitation Summary	$ 14,108	$ 50,579
Private Sector Rehabilitation Summary	$ 525	$ 4,500
Public Mainline Rehabilitation Summary	$ 14,700	$ 76,473
Hydraulic Capacity Replacement		
Upstream MH J33-004 to Downstream Manhole J31-050	$ -	$ 829,455
Pump Station Replacement/Upgrades		
North Wood East Apt.	$ -	$ 320,400
Sub-Total	$ 29,333	$ 1,281,407
Basin 30		
Rehabilitation		
Manhole Rehabilitation Summary	$ 7,550	$ 34,147
Private Sector Rehabilitation Summary	$ 1,400	$ 4,400
Public Mainline Rehabilitation Summary	$ 10,516	$ 80,232
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ -	$ 700
Sub-Total	$ 19,466	$ 118,779
Basin 17		
Rehabilitation		
Manhole Rehabilitation Summary	$ 19,535	$ 81,335
Private Sector Rehabilitation Summary	$ 24,175	$ 26,950
Public Mainline Rehabilitation Summary	$ 35,650	$ 1,229,568
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ -	$ 500
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 3,500	$ -
Hydraulic Capacity Replacement		
Upstream MH G27-179 to Downstream Manhole G27-177	$ 57,078	$ -
Upstream MH G26-268 to Downstream Manhole G25-078	$ 171,519	$ -
Upstream MH G27-183 to Downstream Manhole G27-163	$ 186,770	$ -
Sub-Total	$ 498,227	$ 1,338,353
Basin 16		
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ 6,300	$ 21,500
More Investigation Required	$ -	$ -
Sub-Total	$ 6,300	$ 21,500
Basin 12		
Hydraulic Capacity Replacement		
Upstream MH G25-017 to Downstream Manhole G25-015	$ 241,043	$ -
Sub-Total	$ 241,043	$ -
Basin 8		
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ 450	$ 11,500
Hydraulic Capacity Replacement		
Upstream MH F25-036 to Downstream Manhole F25-030	$ 354,993	$ -
Sub-Total	$ 354,993	$ -
Basin 19		
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 14,000	$ 123,946
Sub-Total	$ 14,000	$ 123,946
Basin 2		
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ 1,800	$ 6,450
Pump Station Replacement/Upgrades		
Red Lobster	$ 424,500	$ -
Village Fair Mall	$ -	$ 298,800
Days Inn	$ -	$ 298,800

Wastewater Collection System Program Summary	Priority 1 Preliminary Cost	Priority 2 Preliminary Cost
Sub-Total	$ 424,500	$ 597,600
Basin 24		
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 5,250	$ 30,312
Sub-Total	$ 5,250	$ 30,312
Basin 21		
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 17,500	$ 94,836
Sub-Total	$ 17,500	$ 94,836
Basin 22		
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ 450	$ 1,350
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 24,241	$ 46,150
Sub-Total	$ 24,691	$ 47,500
Basin 6		
Pump Station Replacement/Upgrades		
Newell Rd #1	$ 358,200	$ -
Hwy 39 #1	$ 318,400	$ -
Newell Rd #2	$ -	$ 376,500
Sub-Total	$ 676,600	$ 376,500
Basin 10		
Hydraulic Capacity Replacement		
Upstream MH E28-009 to Downstream Manhole LS-AT	$ 580,138	
Upstream MH F30-175 to Downstream Manhole F30-158	$ 197,972	
Upstream MH F31-070 to Downstream Manhole F30-185	$ 164,935	
Pump Station Replacement/Upgrades		
65th Ave.	$ 470,400	$ -
North Hills St.	$ -	$ 239,000
MCC	$ -	$ 298,800
Sub-Total	$ 1,413,445	$ 537,800
Basin 28		
Pump Station Replacement/Upgrades		
61st Court	$ -	$ 239,000
Sub-Total	$ -	$ 239,000
Basin 11		
Pump Station Replacement/Upgrades		
Lower Bounds Rd	$ -	$ 298,800
Sub-Total	$ -	$ 298,800
Basin 15		
Hydraulic Capacity Replacement		
Upstream MH G32-078 to Downstream Manhole G31-131	$ 482,968	$ -
Sub-Total	$ 482,968	$ -
Basin 20		
Hydraulic Capacity Replacement		
Upstream MH G29-032 to Downstream Manhole G28-053	$ 236,039	$ -
Sub-Total	$ 236,039	$ -
Basin 18		
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 3,500	$ -
Sub-Total	$ 3,500	$ -
Basin 23		
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 1,750	$ -
Sub-Total	$ 1,750	$ -
Basin 13		
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ -	$ -

Wastewater Collection System Program Summary	Priority 1 Preliminary Cost	Priority 2 Preliminary Cost
Pump Station Replacement/Upgrades		
Pancake Field	$ -	$ 239,000
Hydraulic Capacity Replacement		
Upstream MH G28-152 to Downstream Manhole G26-128	$ 1,027,799	$ -
Sub-Total	$ 1,027,799	$ 239,000
Basin 27		
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ -	$ 250
Hydraulic Capacity Replacement		
Upstream MH I28-069 to Downstream Manhole I27-080	$ 494,755	$ -
Sub-Total	$ 494,755	$ -
Basin 1		
Hydraulic Capacity Replacement		
Upstream MH G25-043 to Downstream Manhole G25-029	$ 249,385	$ -
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ 450	$ 1,200
Sub-Total	$ 249,385	$ -
Out of Basin Limits		
Pump Station Replacement/Upgrades		
Newell Rd #3	$ -	$ 376,500
Sub-Total	$ -	$ 376,500
Subtotals		
Manhole Rehabilitation Summary	$ 41,193	$ 166,061
Private Sector Rehabilitation Summary	$ 26,100	$ 35,850
Public Mainline Rehabilitation Summary	$ 60,866	$ 1,386,273
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)	$ 9,450	$ 43,450
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)	$ 69,741	$ 295,244
Hydraulic Capacity Replacement	$ 4,445,394	$ 829,455
Pump Station Replacement/Upgrades	$ 1,571,500	$ 2,985,600
Total	**$ 6,224,244**	**$ 5,741,933**

Collection System Program Rehabilitation Summary	Priority 1 Occurances	Priority 1 Preliminary Cost	Priority 2 Occurances	Priority 2 Preliminary Cost
Basin 5				
Manhole Rehabilitation Summary				
Rehab 1: Replace Manhole Ring & Cover	1	$ 550	1	$ 550
Rehab 2: Realign and Seal Manhole Ring & Cover	4	$ 1,750	20	$ 9,250
Rehab 3: Raise Manhole or Mainline Cleanout to Grade	17	$ 6,100	18	$ 5,850
Rehab 4: Structurally Repair Chimney/Cone and Coat	2	$ 850	3	$ 1,300
Rehab 5: Clean Manhole, Repair as Needed and Coat	2	$ 1,758	16	$ 19,584
Rehab 6: Reconstruct Manhole Bench & Invert	0	$ -	2	$ 900
Rehab 7: Install Inflow Protector Insert for Manhole, T-cone stopper for cleanout	16	$ 1,600	29	$ 2,895
Rehab 8: Stop I/I, Clean, Repair Pipe Seal and/or Seam and Coat Area	5	$ 1,500	29	$ 10,250
Rehab 9: Clean Manhole of Debris	0	$ -	0	$ -
Rehab10: Replace Manhole	0	$ -	0	$ -
Subtotal	47	$ 14,108	118	$ 50,579
Private Sector Rehabilitation Summary				
Disconnect Abandoned Service Line	0	$ -	0	$ -
Disconnect Roof Drain	0	$ -	0	$ -
Install Cleanout	1	$ 450	0	$ -
Notify Resident of Faulty Plumbing	3	$ 75	0	$ -
Point Repair	0	$ -	4	$ 1,800
Replace Missing Cleanout Cap	0	$ -	14	$ 700
Repair Broken Cleanout	0	$ -	8	$ 2,000
Subtotal	4	$ 525	26	$ 4,500
Public Mainline Rehabilitation Summary				
Cured In Place Pipe	0	$ -	4	$ 41,852
Dye Flood	0	$ -	1	$ 400
CCTV	0	$ -	1	$ 333
Plug Overflow Pipe at Manhole G26-041	0	$ -	0	$ -
Point Repair- Unpaved	2	$ 3,632	0	$ -
Point Repair	2	$ 3,667	0	$ -
Repair Broken Cleanout	1	$ 250	0	$ -
Replace Section of Mainline	1	$ 7,150	0	$ -
Replace 6 inch Line Segment	0	$ -	3	$ 32,436
Remove Roots	0	$ -	2	$ 1,452
Subtotal	6	$ 14,700	11	$ 76,473
Basin 17				
Manhole Rehabilitation Summary				
Rehab 1: Replace Manhole Ring & Cover	11	$ 6,925	31	$ 19,200
Rehab 2: Realign and Seal Manhole Ring & Cover	12	$ 6,975	42	$ 21,900
Rehab 3: Raise Manhole or Mainline Cleanout to Grade	2	$ 1,000	4	$ 1,850
Rehab 4: Structurally Repair Chimney/Cone and Coat	1	$ 600	23	$ 12,850
Rehab 5: Clean Manhole, Repair as Needed and Coat	1	$ 1,535	13	$ 16,276
Rehab 6: Reconstruct Manhole Bench & Invert	2	$ 1,000	7	$ 2,909
Rehab 7: Install Inflow Protector Insert for Manhole, T-cone stopper for cleanout	15	$ 1,500	35	$ 3,500
Rehab 8: Stop I/I, Clean, Repair Pipe Seal and/or Seam and Coat Area	0	$ -	9	$ 2,850
Rehab 9: Clean Manhole of Debris	0	$ -	0	$ -
Rehab10: Replace Manhole	0	$ -	0	$ -
Subtotal	44	$ 19,535	164	$ 81,335
Private Sector Rehabilitation Summary				
Disconnect Abandoned Service Line	54	$ 21,150	$ -	$ -
Disconnect Roof Drain	1	$ 200	$ -	$ -
Install Cleanout	0	$ -	$ -	$ -
Notify Resident of Faulty Plumbing	5	$ 125	$ -	$ -
Point Repair	0	$ -	55	$ 22,500
Replace Missing Cleanout Cap	0	$ -	9	$ 450
Repair Broken Cleanout	0	$ -	7	$ 1,500
Subtotal	60	$ 21,475	71	$ 24,450
Public Mainline Rehabilitation Summary				
Cured In Place Pipe	0	$ -	$ 60	$ 1,177,208
Dye Flood	0	$ -	$ 2	$ 800
CCTV	0	$ -	$ 6	$ 4,317
Plug Overflow Pipe at Manhole G26-041	1	$ 200	$ -	$ -
Point Repair- Unpaved	3	$ 4,515	$ -	$ -
Point Repair	19	$ 30,685	$ 15	$ 25,225
Repair Broken Cleanout	1	$ 250	$ -	$ -
Replace Section of Mainline	0	$ -	$ -	$ -
Replace 6 inch Line Segment	0	$ -	$ 1	$ 20,502
Remove Roots	0	$ -	$ 1	$ 1,516

Collection System Program Rehabilitation Summary	Priority 1 Occurances	Priority 1 Preliminary Cost	Priority 2 Occurances	Priority 2 Preliminary Cost
Subtotal	24	$ 35,650	85	$ 1,229,568
Basin 30				
Manhole Rehabilitation Summary				
Rehab 1: Replace Manhole Ring & Cover	0	$ -	2	$ 1,300
Rehab 2: Realign and Seal Manhole Ring & Cover	6	$ 3,300	24	$ 13,550
Rehab 3: Raise Manhole or Mainline Cleanout to Grade	7	$ 2,750	1	$ 350
Rehab 4: Structurally Repair Chimney/Cone and Coat	0	$ -	3	$ 1,800
Rehab 5: Clean Manhole, Repair as Needed and Coat	0	$ -	11	$ 10,897
Rehab 6: Reconstruct Manhole Bench & Invert	0	$ -	4	$ 1,800
Rehab 7: Install Inflow Protector Insert for Manhole, T-cone stopper for cleanout	12	$ 1,200	14	$ 1,400
Rehab 8: Stop I/I, Clean, Repair Pipe Seal and/or Seam and Coat Area	1	$ 300	8	$ 3,050
Rehab 9: Clean Manhole of Debris	0	$ -	0	$ -
Rehab10: Replace Manhole	0	$ -	0	$ -
Subtotal	26	$ 7,550	67	$ 34,147
Private Sector Rehabilitation Summary				
Disconnect Abandoned Service Line	2	$ 3,600	0	$ -
Disconnect Roof Drain	0	$ -	0	$ -
Install Cleanout	1	$ 450	0	$ -
Notify Resident of Faulty Plumbing	2	$ 50	0	$ -
Point Repair	0	$ -	5	$ 4,500
Replace Missing Cleanout Cap	0	$ -	3	$ 150
Repair Broken Cleanout	0	$ -	8	$ 2,250
Subtotal	5	$ 4,100	16	$ 6,900
Public Mainline Rehabilitation Summary				
Cured In Place Pipe	0	$ -	5	$ 60,762
Dye Flood	2	$ 800	0	$ -
CCTV	2	$ 2,016	0	$ -
Plug Overflow Pipe at Manhole G26-041	0	$ -	0	$ -
Point Repair- Unpaved	5	$ 7,700	0	$ -
Point Repair	0	$ -	3	$ 5,700
Repair Broken Cleanout	0	$ -	0	$ -
Replace Section of Mainline	0	$ -	0	$ -
Replace 6 inch Line Segment	0	$ -	1	$ 13,770
Remove Roots	0	$ -	0	$ -
Subtotal	9	$ 10,516	9	$ 80,232
Neel-Shaffer/ADS Rehabilitation Recommendations (1999 Report)				
Disconnect Abandoned Service Line				
Basin 8	1	$ 450	0	$ -
Basin 16	14	$ 6,300	0	$ -
Basin 1	1	$ 450	0	$ -
Basin 2	4	$ 1,800	0	$ -
Basin 22	1	$ 450	0	$ -
Smoke Test to Confirm Segment for Dye Flood and CCTV				
Basin 1	0	$ -	3	$ 750
Basin 2	0	$ -	9	$ 2,250
Basin 8	0	$ -	4	$ 1,000
Basin 16	0	$ -	23	$ 5,750
Basin 17	0	$ -	2	$ 500
Basin 22	0	$ -	0	$ -
Basin 27	0	$ -	0	$ -
Basin 30	0	$ -	1	$ 250
Repair Mainline Cleanout				
Basin 8	0	$ -	1	$ 250
Point Repair				
Basin 1	0	$ -	1	$ 450
Basin 2	0	$ -	6	$ 2,700
Basin 8	0	$ -	20	$ 9,000
Basin 16	0	$ -	30	$ 13,500
Basin 17	0	$ -	0	$ -
Basin 22	0	$ -	3	$ 1,350
Basin 27	0	$ -	0	$ -
Basin 30	0	$ -	1	$ 450
Repair Service Cleanout				
Basin 1	0	$ -	0	$ -
Basin 2	0	$ -	6	$ 1,500
Basin 8	0	$ -	5	$ 1,250

Collection System Program Rehabilitation Summary	Priority 1 Occurances	Priority 1 Preliminary Cost	Priority 2 Occurances	Priority 2 Preliminary Cost
Basin 16	0	$ -	9	$ 2,250
Basin 17	0	$ -	0	$ -
Basin 22	0	$ -	0	$ -
Basin 27	0	$ -	1	$ 250
Basin 30	0	$ -	0	$ -
Subtotal		$ 9,450		$ 43,450
Mainline Rehabilitation Summary (From Gas Company Video Tape Conversion)				
CIPP				
Basin 13	0	$ -	0	$ -
Basin 17	0	$ -	0	$ -
Basin 18	0	$ -	0	$ -
Basin 19	0	$ -	2	$ 48,242
Basin 21	0	$ -	3	$ 70,132
Basin 22	0	$ -	2	$ 46,150
Basin 23	0	$ -	0	$ -
Basin 24	0	$ -	1	$ 30,312
Remove Roots and CIPP				
Basin 13	0	$ -	0	$ -
Basin 17	0	$ -	0	$ -
Basin 18	0	$ -	0	$ -
Basin 19	0	$ -	3	$ 75,704
Basin 21	0	$ -	1	$ 24,704
Basin 22	0	$ -	0	$ -
Basin 23	0	$ -	0	$ -
Basin 24	0	$ -	0	$ -
Point Repair/Sectional Liners				
Basin 13	0	$ -	0	$ -
Basin 17	1	$ 1,750	0	$ -
Basin 18	0	$ -	0	$ -
Basin 19	4	$ 10,500	0	$ -
Basin 21	2	$ 8,750	0	$ -
Basin 22	6	$ 15,750	0	$ -
Basin 23	0	$ -	0	$ -
Basin 24	2	$ 5,250	0	$ -
Point Repair				
Basin 13	0	$ -	0	$ -
Basin 17	1	$ 1,750	0	$ -
Basin 18	2	$ 3,500	0	$ -
Basin 19	1	$ 3,500	0	$ -
Basin 21	3	$ 8,750	0	$ -
Basin 22	2	$ 5,250	0	$ -
Basin 23	1	$ 1,750	0	$ -
Basin 24	0	$ -	0	$ -
Point Repair/CCTV				
Basin 13	0	$ -	0	$ -
Basin 17	0	$ -	0	$ -
Basin 18	0	$ -	0	$ -
Basin 19	0	$ -	0	$ -
Basin 21	0	$ -	0	$ -
Basin 22	1	$ 3,241	0	$ -
Basin 23	0	$ -	0	$ -
Basin 24	0	$ -	0	$ -
Subtotal		$ 69,741		$ 295,244
Total		$ 207,350		$ 1,926,878

Collection System Program Hydraulic Capacity Summary									
		Manhole		Diameter (in			Unit Cost	Priority 1	Priority 2
Problem ID	Basin	Upstream	Downstream	Existing	Proposed	Length (ft)	$/ft	Preliminary Cost	Preliminary Cost
EX-17-1	17	G27-179	G27-177	12	18	345.9	$ 165	$ 57,078	$ -
EX-10-1	10	E28-009	LS-AT	16	21	3119	$ 186	$ 580,138	$ -
EX-8-1	8	F25-036	F25-030	24	30	1431.4	$ 248	$ 354,993	$ -
EX-10-2	10	F30-175	F30-158	10	18	1199.8	$ 165	$ 197,972	$ -
EX-10-3	10	F31-070	F30-185	10	18	999.6	$ 165	$ 164,935	$ -
EX-20-1	20	G29-032	G28-053	10	18	1430.5	$ 165	$ 236,039	$ -
EX-12-1	12	G25-017	G25-015	18	24	1164.5	$ 207	$ 241,043	$ -
EX-1-1	1	G25-043	G25-029	24	30	1005.6	$ 248	$ 249,385	$ -
EX-17-2	17	G26-268	G25-078	27	36	593.5	$ 289	$ 171,519	$ -
EX-27-1	27	I28-069	I27-080	15	24	2390.1	$ 207	$ 494,755	$ -
EX-13-1	13	G28-152	G26-128	24	36	3556.4	$ 289	$ 1,027,799	$ -
EX-17-3	17	G27-183	G27-163	12	21	1004.1	$ 186	$ 186,770	$ -
EX-15-1	15	G32-078	G31-131	10	18	2927.1	$ 165	$ 482,968	$ -
FUT-5-1	5	J33-004	J31-050	10	18	5027	$ 165	$ -	$ 829,455
							Total	**$ 2,613,196**	**$ 829,455**

CITY OF MERIDIAN

PIPELINE ANALYSIS, LLC

carollo Engineers...Working Wonders With Water™

Collection System Program Pump Station Summary

Name of Pump Station	Total Cumulative Incoming Flows to Pump (gpm)	Pump Capacity (gpm)	Over/(Under) Capacity (gpm)	Design Flow with 20% growth (gpm)	Priority 1 Preliminary Cost	Priority 2 Preliminary Cost
Red Lobster	1277	1000	(277)	1500	$ 424,500	$ -
Newell Rd #1	775	275	(500)	900	$ 358,200	$ -
Hwy 39 #1	688	275	(413)	800	$ 318,400	$ -
65th Ave.	1979	1200	(779)	2400	$ 470,400	$ -
Newell Rd #2	458	250	(208)	500	$ -	$ 376,500
Newell Rd #3	392	100	(292)	500	$ -	$ 376,500
Lower Bounds Rd	154	150	(4)	200	$ -	$ 298,800
61st Court	89	75	(14)	100	$ -	$ 239,000
Days Inn	152	150	(2)	200	$ -	$ 298,800
MCC	203	100	(103)	200	$ -	$ 298,800
North Hills St.	117	45	(72)	100	$ -	$ 239,000
North Wood East Apt.	371	150	(221)	400	$ -	$ 320,400
Pancake Field	108	100	(8)	100	$ -	$ 239,000
Village Fair Mall	148	100	(48)	200	$ -	$ 298,800

Attachment A1

Sanitary Sewer System Evaluation (Basins 5, 17 & 30) Final Report Vol. 1

Attachment A2

Sanitary Sewer System Evaluation (Basins 5, 17 & 30) Final Report Vol. 2

Attachment B
Wastewater Collection System Operation Review Final Report

Wastewater Collection System Operations Review Final Report

City of Meridian

Department of Public Works

carollo engineers

PIPELINE ANALYSIS, LLC

February 2007

Wastewater Collection System Operations Review Final Report

CITY OF MERIDIAN

CITY OF MERIDIAN
DEPARTMENT OF PUBLIC WORKS

PREPARED BY

carollo engineers

PIPELINE ANALYSIS, LLC

January 2007

Table of Contents

CITY OF MERIDIAN
COLLECTION SYSTEM O&M EVALUATION

I. Executive Summary

A cursory review and evaluation of the wastewater collection system operations was undertaken in association with the Sewer System Evaluation Survey. The purpose of this investigation is to review current practices and, where applicable, recommend changes that will improve customer service, reduce O&M and minimize costs associated with the wastewater collection system.

Located in extreme east central Mississippi (Figure 1), the Meridian collection system consists of approximately 303 miles of gravity sewer with a replacement value of $240 million. The soils are predominately Urban land and Sweatman-Urban land complex, 5 to 25 percent slopes. Figure 2 shows the major soil associations within Meridian. Rapid storm runoff will lessen the time that system defects are exposed or inundated with storm water. Normal annual rainfall is 56.71inches (Figure 3).

Figure 1
Location Map

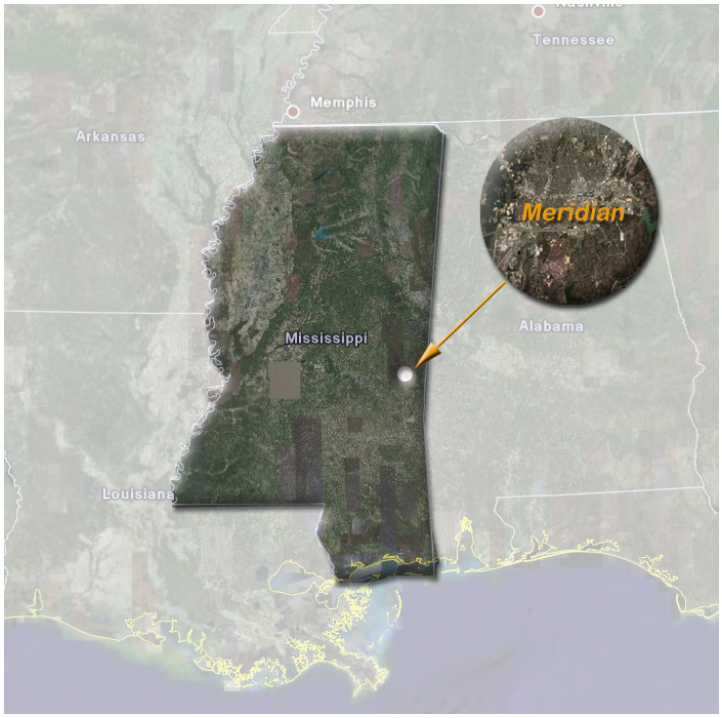
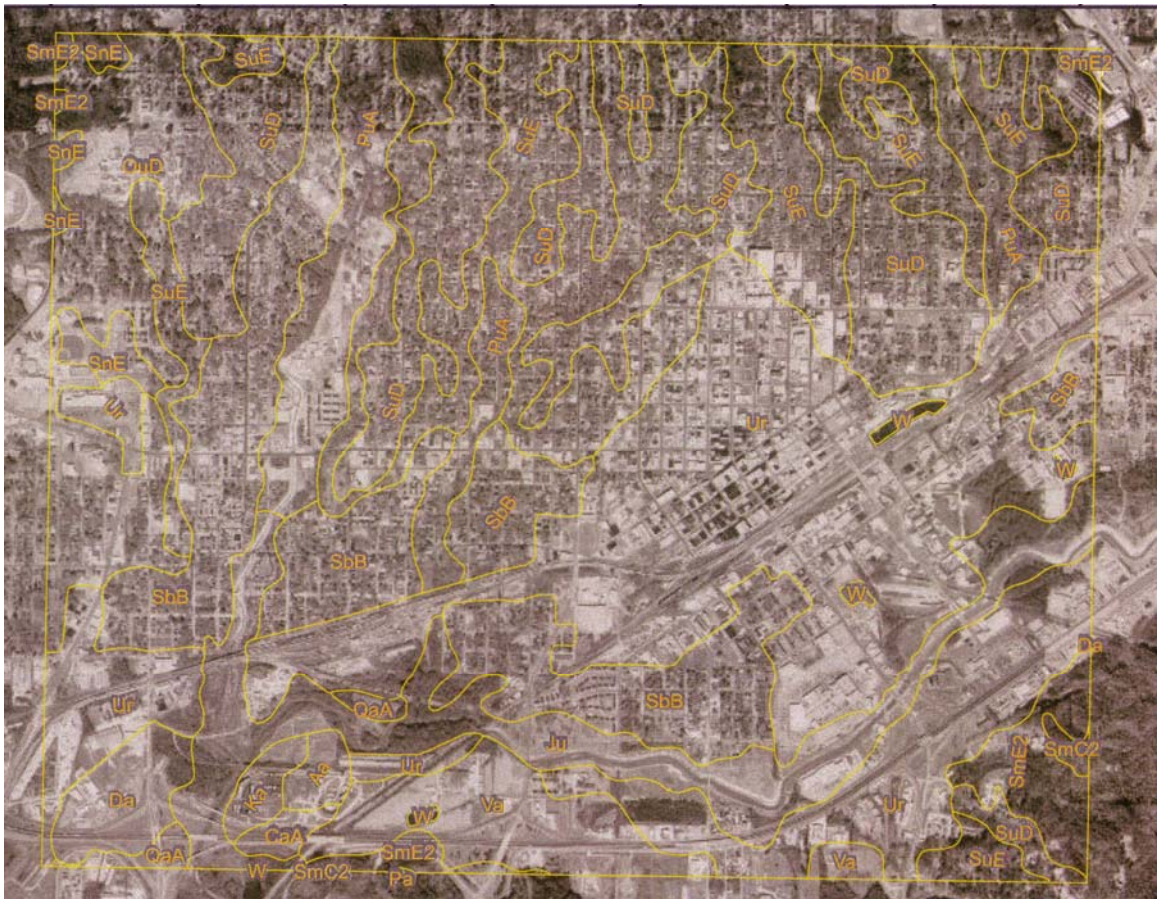


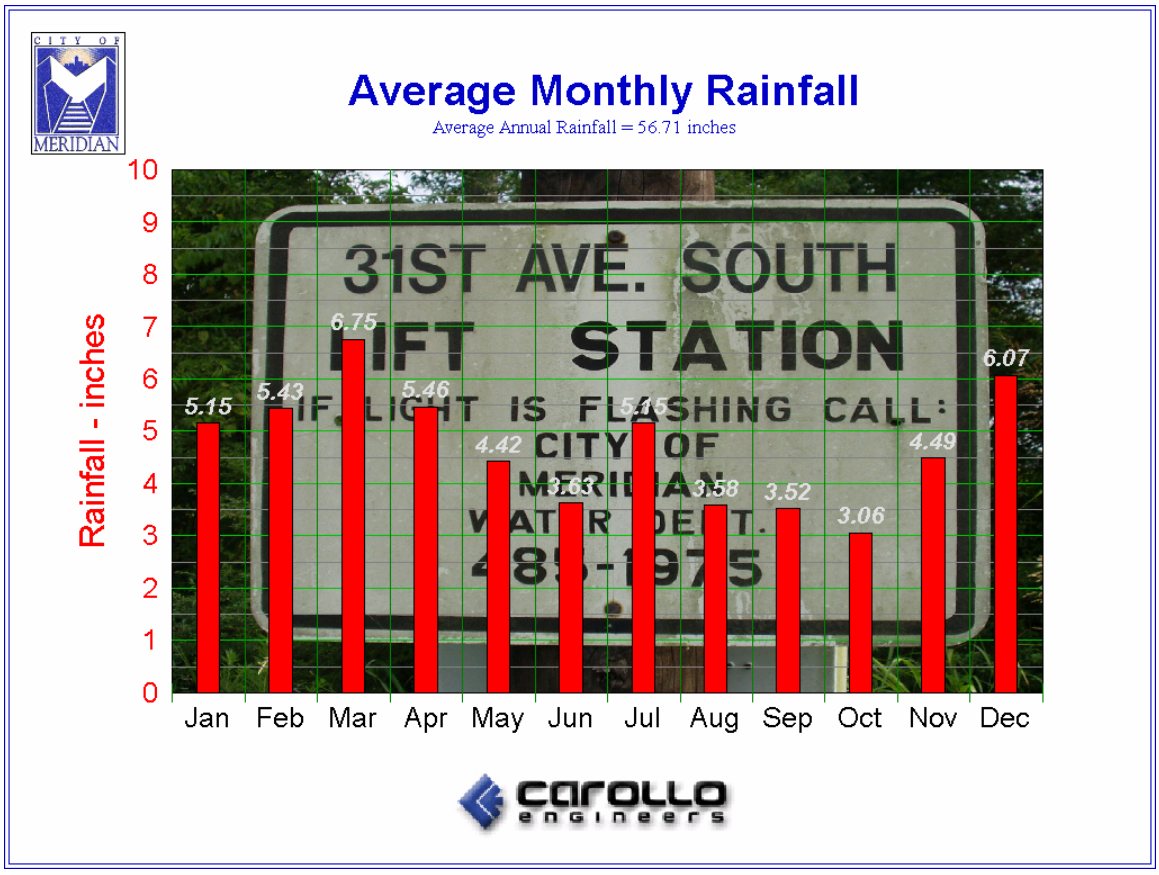
Figure 2
Soils Map



Predominate Soil Associations

Ur Urban land
SuE Sweatman-Urban land complex, 5-15% slopes
SuD Sweatman-Urban land complex, 15-25% slopes
SbB Savannah-Urban land complex, 0-5% slopes

Figure 3
Historical Rainfall



Stretched end to end the underground sewers would reach from Meridian to Atlanta. The shear number of 6-inch vitrified clay pipe is and will continue to be very problematic for the Utility. The high percentage of small diameter vitrified clay pipe will require increased maintenance as it continues to age. Wastewater pipes have a design life of 75-100 years, and portions of the Meridian system are reaching their design life. Rehabilitation or renewal of existing infrastructure is the least cost alternative to replacement. Identifying deterioration and making timely repairs will minimize system renewal costs and extend the life of these valuable underground assets for another 75 to 100 years.

The City currently has a number of successful utility support programs that will require very little integration into the overall framework of the O&M program. The following current City programs/activities have been identified as having functions needed on an on-going basis:

- Geographic Information System (GIS) provides an inventory of installed piping, pipe size and material, and provides updated maps. Supported by the Engineering department, the GIS needs and dependency will increase over time.
- The current system of work orders is providing acceptable levels of service although it is more labor intensive than current paperless systems being implemented nationwide. As the use of wireless systems to communicate with field crews continue in popularity, the City should stay abreast of current technologies that can be implemented to improve response times, maintain electronic record keeping tied to GIS and maximize crew scheduling.
- Hydraulic modeling of the wastewater collection system is currently on-going by Carollo Engineers, Inc. Results from this effort will provide a prioritized plan to ensure future capacity. Having the infrastructure in-place to accommodate growth has been addressed by the City thru the modeling efforts.
- Record Drawings and Specifications are critical to maintaining the collection system. It is impossible to maintain a system if you do not know where it is or the materials of construction. Timely integration of new construction into the City GIS system is critical to provide reliable service. Updating the GIS sewer maps should be expedited so field crews can utilize the most up to date maps.
- Cleaning and Closed-Circuit Television (CCTV) inspections to remove blockages will be a continuing requirement, particularly with the aging clay pipes within the collection system. A procedure to internally inspect (via CCTV) those sewers with chronic stoppages should be established to identify the cause for the repetitive cleaning (ie root intrusion, protruding service collecting debris, partial collapse, etc.). Identifying and then repairing the primary cause of the blockage will reduce repetitive work orders and cost.
- Budgeting and accounting procedures for tracking of capital and O&M expenditures and costs is well organized. Current budgeting procedures and scheduled user rate reviews are keeping the utility marginally funded. Revenues from water and wastewater are used in the general fund for non-water/wastewater projects. Keeping the council appraised of current and future needs, particularly in the area of sewer rehabilitation, will be necessary for Public Works to retain necessary funding for system renewal. Collection system rehabilitation will be expensive and staff should periodically remind the council of the negative impact if repairs are deferred too long.
- Many of the regulatory issues surrounding the collection system are associated with Sanitary Sewer Overflows (SSO's). The Utility has been very proactive in anticipating regulatory issues and implementing programs to address them. By performing hydraulic modeling, evaluating capacity needs and identifying sources of extraneous infiltration/inflow, the City staff is working to reduce overflows and maintain regulatory compliance.

Overall the City of Meridian has implemented many of the programs necessary for sustained maintenance of the wastewater collection system. Table 1 presents a summary of the evaluation findings. Following is a summary of recommendations:

1. Preventive maintenance cleaning is not being undertaken due to insufficient equipment and crews. With an aging system of vitrified clay pipes, additional cleaning crews are recommended to initiate preventive maintenance cleaning. One additional cleaning truck with easement kit should be budgeted. A CCTV inspection van should be budgeted to reduce reoccurring blockages, establish the best least-cost repair strategy and provide acceptance inspection for warranty items.
2. Vacant positions within the department should be filled to implement repairs and preventive maintenance. The high number of lift stations and the aging infrastructure will require additional personnel to maintain this system of pumps, electrical systems and instrumentation. Once vacant positions have been filled, a review of labor needs throughout the department should be undertaken. Department staffing, as it relates to the collection system, is currently only marginally keeping up with demands. Additional cleaning and repair crews will be required to maintain current levels of service and provide for more proactive maintenance.
3. The Sewer Use Ordinance (SUO) should be reviewed by Public Works staff and updated as needed to address infiltration/inflow, illicit connections and grease. Grease is a major cause for system blockages. More thorough training and inspection is recommended to ensure grease traps are being maintained and periodically cleaned. The State Health Department does not currently inspect grease traps. Since the Health Department visits all major contributors of grease, they would be the logical choice to perform the grease trap inspections. Further investigation is warranted to determine the possibility of the Health Department conducting grease trap inspections. Otherwise, the City's code enforcement should physically inspect each restaurant grease trap, review cleaning manifests and schedule re-inspection if in non-compliance. To accomplish an effective FOG program, the ordinance will require updating. Code enforcement and staff should review design criteria for grease traps and consider implementing grease trap installations at apartments and other multifamily residential units.
4. As-built sewer construction drawings are not available to update the collection system maps in a timely manner. It is recommended that approved "construction drawings" be placed into the GIS mapping system at the beginning of construction in a way that distinguishes these lines as "under construction". This will allow maintenance crews to have access to locations of manholes, pipes (water lines) etc. should they receive a service call. Maintenance crews should have the best available information on asset locations. Waiting until a construction project is complete hinders repairs (particularly emergency repairs). Once the project is completed, as-built drawings can be used to update the GIS where needed. With "construction drawings" added to the GIS, warrantee during construction and after project acceptance can be tracked easily. New projects should be differentiated by color or symbols such that service requests can be forwarded to the contractor for warrantee repairs as needed. Prior to the warrantee period expiring, a final inspection can be scheduled and performed. Once the final warrantee inspection is completed and accepted, then the lines can be entered into the normal collection system total inventory.
5. Asset inventory and map update, with respect to GIS maps showing sewer lines and manholes is good; however, only about 65% of the system has been updated in GIS. To expedite the use of GIS mapping and the many efficiencies associated with its use, we recommend that the "E" size

blue-line sewer maps be used to reconcile the current GIS Grid Maps to generate "visually correct" maps. The resulting 11x17 updated grid maps will provide easy to use accurate maps for line maintenance. Having all assets numbered and included in the electronic map database will provide a mechanism for fast map updates.

6. When new sewers are being designed, the impact on downstream pipes should be reviewed. The current hydraulic modeling efforts will address current and future capacity needs for sewers 10-inch and larger. New subdivisions or developments should be reviewed to ensure adequate downstream capacity exists and/or determine the impact on the existing system. Where sewer designs are being outsourced to consultants, the scopes of work should include a review of CIP planning documents and the project impact on downstream capacity.
7. Overall the safety program is very good. Recommendations would be to annually conduct a safety drill to review response times and coordination with fire rescue and prepare a written safety manual for each employee.
8. Satellite City Agreements should be reviewed annually by Public Works staff and City Attorney to determine the practicality of updating the agreements to address any concerns (such as grease, high infiltration/inflow, toxic discharges, etc.).
9. The aging sewer infrastructure will experience increased costs to rehabilitate and extend the life of these assets. Long-term funding will be required to repair sources of infiltration/inflow, provide for CIP projects and for unpredicted failures requiring emergency repairs. If rehabilitation is deferred, then the cost to repair will increase over time as fewer trenchless (less expensive) methods of repair are applicable. The City should consider the use of annual or term contracts for rehabilitation (lining, pipe bursting, etc.) that could be budgeted. Such contracts can be bid to minimize sewer rehabilitation costs.
10. Development of a long-term Capital Improvement Plan (CIP) is recommended to provide administrators with current and future needs and estimated costs. Using the results of the hydraulic model currently being developed, along with results of the current sewer system evaluation survey, will provide a start for a long-term CIP plan.

Table 1 - Operations Review Summary

City of Meridian, Department of Public Works

Program Catetory, Elements, and Sub-elements	Description/Comments	Rating of Adequacy or Completeness (1-10)										Status of Program		
		1	2	3	4	5	6	7	8	9	10	Exists	Does Not Exist	Not Applicable
Collection System Policy														
Customer Service	*Very good; aging system*								8					
Regulatory Compliance										9				
SSO Written Policy	*No written policy, procedures in-place*						6							
Regulatory Reporting										9				
Regulatory Knowledge	*Excellent*										10			
Managing Assests										9				
GIS Mapping	*Excellent, updating in progress*									9				
Construction Inspection									8					
Written Warrantee Tracking	*No written policy*							7						
Flow Monitoring											10			
Manhole Inspection											10			
Smoke Testing											10			
CCTV	*Insufficient Equipment*			3										
Cleaning	*Insufficient Equipment*					5								
Work Management	*Very good, aging tracking system*									9				
Maintenance														
Corrective Maintenance	*Majority of maintenance*									9				
Prority System										9				
Backlog System									8					
Preventitive Maintenance	*Limited by labor/equipment resources*							7						
Prority System								7						
Hydraulic Cleaning						5								
Cleaning Debris Removal									8					
Pretreatment Program									8					
FOG Written Program	*No written policy*	1												
Emergency Response Plan	*No written Plan*							7						
Engineering														
As-built Plans									8					
Asset Inventory									8					
SewerSystem Maps	*Converting to GIS 11x17 Grid Maps*									9				
Gravity Sewer Design										9				
Construction Inspection	*No written policy*							7						
Condition Assessment	*Currently on-going*									9				
Rehabilitation/Replacement for Lines and Manholes	*Limited by budget*			3										
Capacity assurance	*Hydraulic model in development*									9				
Technical Support Functions														
Information Management	*Very good but aging system*						6							
Contingency Planning	*Very good but no written plan*					5								
Source Control	*Good pretreatment*							7						
Rehabilitation Methods Understanding										9				
Legal Support										9				
Administrative Support														
Human Resources	*Time required to fill positions*							7						
Procurement									8					
Spare Parts									8					
Financial						5								
Capitol Improvement Plan (CIP)	*Not budgeted*	1												
Annual Rehabilitation Budget	*Not budgeted*	1												
Contingency/Emergency Budget	*Not budgeted*	1												
Rate Analysis										9				
Satellite Community Agreements										9				
Public Information	*Very good*										10			
Staff Training														
Written Safety Program	*No written manual*				4									
Scheduled Safety Meetings										9				
Schools/Certification Attendance	*Limited by budget*				4									

The cost to implement these recommendations is summarized in Table 2 along with a proposed implementation schedule. Note that a majority of the recommendations can be undertaken by staff at minimal cost while some will require going thru the budgeting process.

Table 2
Implementation Estimated Cost & Schedule

	Description	Schedule	Estimated Cost
1	Jet Cleaner with Easement Kit/CCTV Inspection Van	1 year	$300,000
2	Fill Vacant Positions – Evaluate Needs	6 months	In-house
3	Sewer Use Ordinance & FOG Review/Revision	1 year	In-house
4	Construction Drawing Policy Review/ Track Warrantee	6 months	In-house
5	GIS Sewer Map Update	3 months	In-house
6	Review Downstream Impact of Development	Immediate	In-house
7	Develop Safety Manual/ Review Update Safety Policy	Immediate	In-house
8	Review Customer City Impact Annually	1 year	In-house
9	Annual/Term Contracts for Trenchless Rehabilitation	Immediate*	Budget Item
10	Develop Capital Improvement Plan (CIP)	Immediate*	In-house

* Immediately begin discussions with City Administration and Council to develop long-term financing for sewer (and water) system renewal.

II. Collection System

a. Organization

Figure 4 presents the city organizational chart. An equivalent updated organizational chart for the Public Works Department should be developed to address recent trends in regulatory reporting. The departmental organization chart should present those City staff who are responsible for implementing, managing and updating the SSO abatement programs. This includes those staff who are responsible for managing the SSO response, investigating the cause and reporting the SSO to the appropriate regulatory agencies.

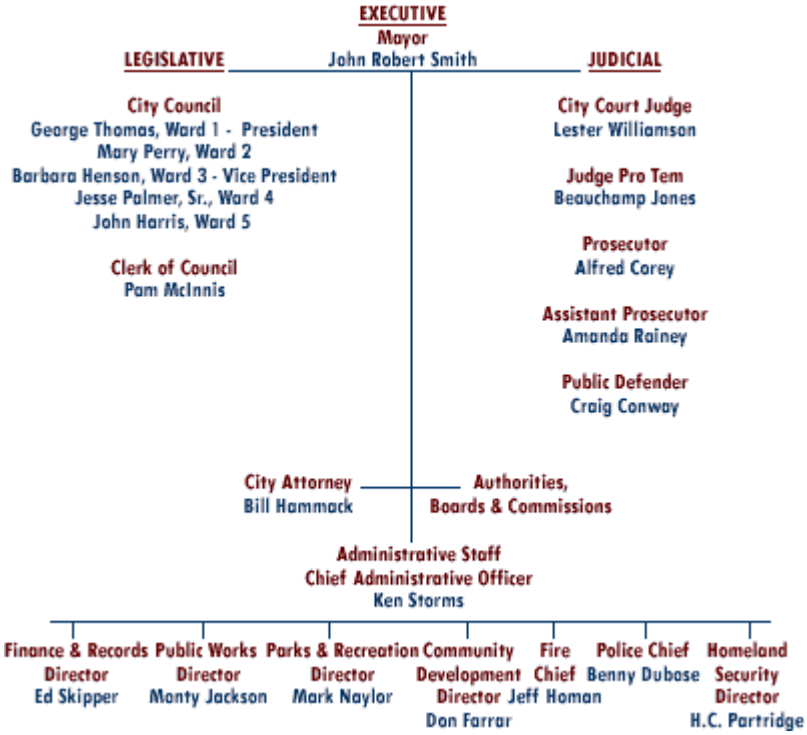


Figure 4
City Organizational Chart

Chief Administrative Officer and Director – Establishes department policy, plans strategy, leads staff, allocates resources, delegates responsibility, authorizes outside contractors to perform services and may serve as public information officer. Prepares wastewater collection system planning documents; manages capital improvement delivery system; prepares itemized budgets; and coordinates development and implementation of various water and sewer programs.

Operations Superintendent – Manages field operations and maintenance activities, provides relevant information to management, prepares and implements contingency plans, leads emergency response, investigates and reports SSO's, and trains field crews. Provides over-site and establishes priorities and goals of sewer maintenance, inflow and sewer repair crews. Reviews performance indicators. Maintains sewer lift stations and telemetry systems.

Field Supervisors – Oversee scheduling of maintenance crews, inflow reduction crews and repair crews.

Field Crew – Perform maintenance activities, mobilize and respond to notification of stoppages and SSO's, inspect and test manholes and mainlines for infiltration/inflow and perform sewer repairs.

An aging sewer infrastructure will require increased resources to proactively maintain the collection system at least cost. Figure 5 presents a proposed organizational chart for the collection system department.

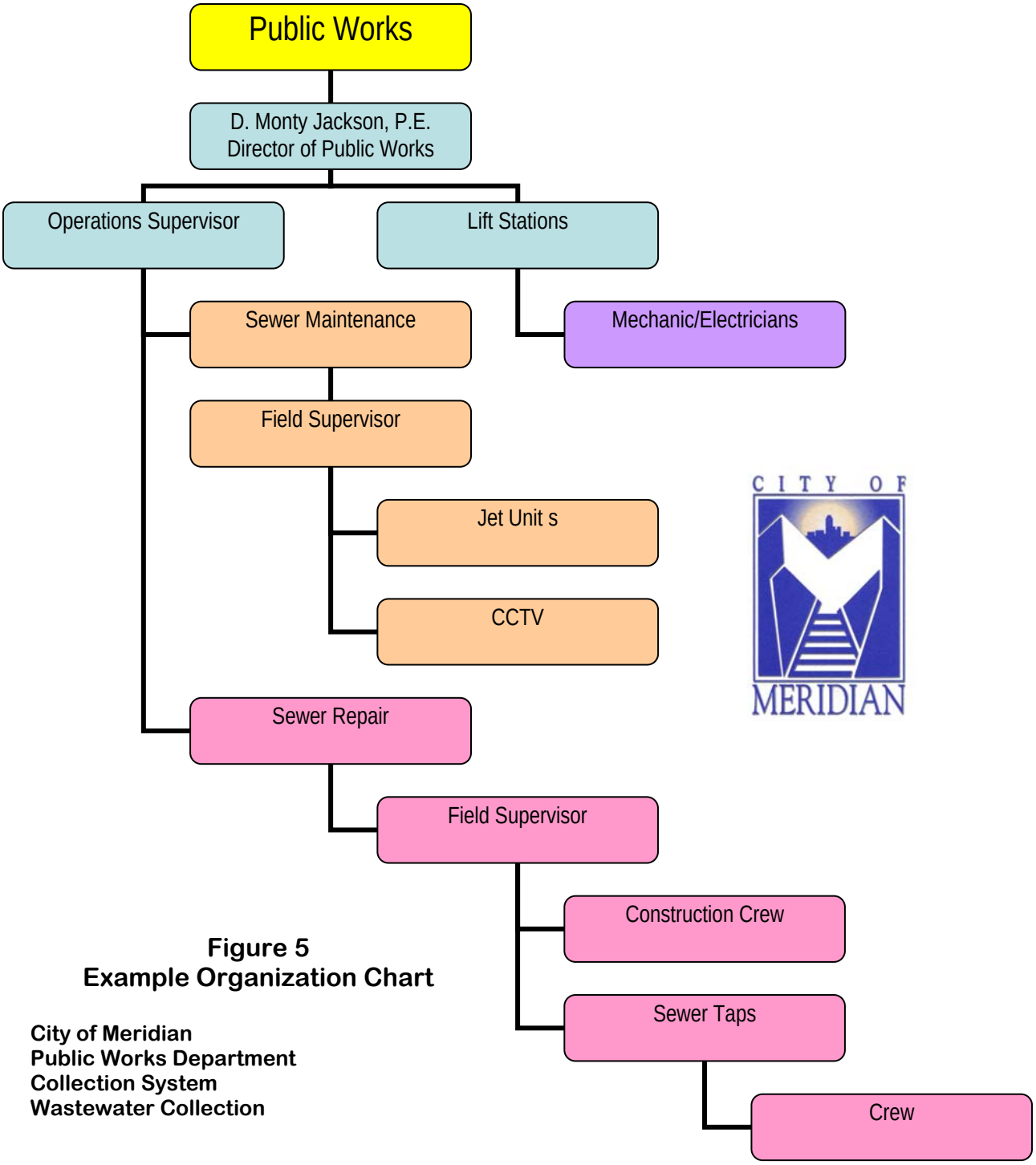


Figure 5
Example Organization Chart

City of Meridian
Public Works Department
Collection System
Wastewater Collection

b. Regulatory Compliance

Sanitary sewer overflows remain a concern for long-term compliance. New sewers are being added each year that will require maintenance and old sewers will require increasing maintenance. Because of the age, soil conditions and rainfall potential, additional crews and equipment will be required to maintain the same level of customer service. As a result, the cost of service can be expected to increase as old sewers are rehabilitated and/or replaced. Funding for collection system repair and rehabilitation will need to increase to provide reliable service. Term contracts for annual rehabilitation should be considered to provide a mechanism for long-term system renewal. With a replacement value of $240 Million and assuming a design life of 100 years, then approximately $2.4 Million per year would be required to fully fund replacement. Nationally, replacement is the most expensive option at approximately $150/lf while rehabilitation is $15/lf on a system basis. For Meridian, the estimated rehabilitation cost would approach $24 million. This cost does not include capacity upgrades. Upon completion of the current sewer system evaluation of Basins 5, 17 and 30 a more accurate estimate of rehabilitation needs will be available for budgeting.

c. Satellite Communities

The City of Meridian provides wastewater treatment for Marion (Population 1,389), a prison (including a truck stop) and the Naval Air Station (Population 4,000). These satellite communities have permanent flow meters at each entry point into the Meridian collection system. The City has agreements with the satellite communities and rates are established for treatment by ordinance. (Appendix A presents the City Code of Ordinances-Chapter 25 Water & Sewers, Article II - Rates)

III. Maintenance

The City of Meridian has recently initiated a Sanitary Sewer Evaluation. As part of the evaluation, the City is developing a detailed plan to address SSO's and infiltration/inflow. Following are procedures used to evaluate the collection system condition:

a. Priority Areas

Flow monitoring is used to establish the areas of the collection system that contribute to excessive rainfall dependent infiltration/inflow (RDII). The City has completed a flow monitoring study in which thirty portable flow meters were placed within the system to trace excessive infiltration/inflow and prioritize additional field efforts. Results of this flow monitoring was presented in a July 2006 "Wastewater Flow Monitoring Final Report". The data presented in the report was used to prioritize areas of the collection system for subsequent inspections. Figure 6 presents the priority ranking of areas based on the severity of infiltration/inflow.

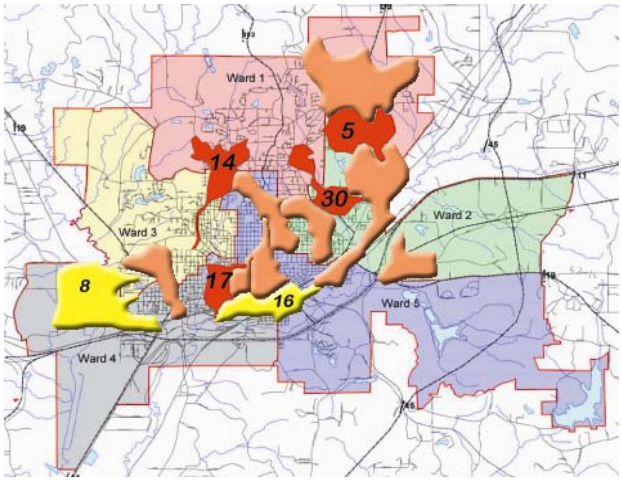


Figure 6
Priority Ranking of Basins

b. Manhole Inspection

Manhole inspections are outsourced and are being undertaken in priority basins. Inspections are performed for a complete basin and defects identified. Repairs are prioritized and scheduled. Map corrections are forwarded to the Engineering Department for updating the GIS maps.

c. Smoke Testing

High capacity smoke blowers are used by City staff on a limited basis to locate sources of odor and inflow into the collection system. Both mainline and service laterals are tested and defects documented for repair. Systematic smoke testing is outsourced in association with the priority basin evaluations.

d. CCTV

The City owns one push camera for sewer inspection. The Department has several uses for the equipment including:

1. Inspection of problem line segments
2. Locate illicit connections
3. Inspect chronic blockages to locate cause and determine repair strategy
4. Condition assessment to determine degree of roots, deterioration, groundwater infiltration, pipe joint integrity, service tap conditions, etc.

Based on the size and age of the collection system, a CCTV inspection van should be budgeted. A crawler camera with pan and tilt camera will provide an additional level of evaluation to pinpoint the cause of obstructions or chronic stoppages. The information from CCTV inspection will reduce the number of repetitive work orders at the same location by establishing the cause and repair strategy.

In addition to inspecting chronic stoppages, the CCTV equipment should be available to internally inspect new construction to ensure pipelines and service taps are constructed according to City specifications. Warranty and acceptance testing will identify any construction defects that can then be repaired by the contractor while the pipeline is still under warranty. A national program to certify CCTV operators is gaining importance. The Pipeline Assessment Certification Program (PACP) is a method to ensure sewer pipeline defects are coded and described uniformly. Using PACP certified operators ensures that outside contractors performing CCTV inspection and in-house inspections are both using the same terminology. To be compliant with the PACP program, the City will be required to have CCTV operators attend a two day training school and pass a written exam. The software used in the CCTV truck should conform to PACP requirements. All outside CCTV inspection of sewer lines for the City of Meridian should be required to provide the video, inspection logs and database in PACP certified format. Videos should be provided on DVD and/or hard drives for ease of storage and use. VHS video tapes should not be allowed unless specifically approved by the Department. All contractors performing CCTV inspection for new or existing sewer should be required to provide the data in the PACP formats.

e. Cleaning

Cleaning of sanitary sewers is an extremely important maintenance function. Internal cleaning is a daily requirement to 1) restore interrupted service due to blockages; 2)

remove root intrusion; 3) remove grease blockages; 4) remove settled debris; 5) clean prior to CCTV inspection to obtain an unobstructed view of the pipeline; 6) remove floating debris from lift station wet wells; 7) remove grit from sand traps; and 8) restore capacity and minimize SSO's. Cleaning equipment is essential in providing good customer service. The City owns two jetting trucks. A jetting truck uses a high pressure hose reel and nozzle to remove blockages and perform regular cleaning of lines. Various nozzles are available depending on the types of debris being removed. Root cutters can also be installed on the hose reel to cut roots. A jet-vac cleans the line with high pressure water but also vacuums the collected debris which is in turn hauled to a disposal site. Benefits of the jet-vac are many including removal of floating and settled debris in wet wells, sewer pipes, storm catch basins, etc. Due to the continual use of this cleaning equipment and the harsh environment it has to work in, vehicle maintenance is critical to dependable service. With over 300 miles of sanitary sewer, the need for additional jet cleaning equipment will become necessary. Initially, one additional jetting truck is recommended. In addition, an easement kit is recommended to access remote areas and where additional hose is necessary to clean pipelines. An easement kit is simply a hose reel extension of the jet truck that can be maneuvered into remote back yards or where the truck can not be driven to the manhole (particularly wooded easements).

f. System Repairs

As stated earlier in this report, the Meridian collection system has a very high percentage of clay sewer. Most of these lines are nearing their design life of 75 years; however, thru various rehabilitation methods these assets can be renewed to extend the useful life. Such renewal is several magnitudes less expensive than replacement. Currently the City staff is cleaning sewers to remove blockages associated with complaints. Some preventive maintenance cleaning is being undertaken on a limited basis where repeat calls are common.

Sewer mainline repairs are on the rise. The need for additional crews to perform repairs will increase as the existing clay pipe continues to deteriorate. This trend needs to be reversed. Pipe bursting 6-inch clay pipe to 8-inch should also be considered for areas with chronic problems. As mainline sewers are replaced, service cleanouts should be installed at the property line if not currently present.

g. Performance Indicators – The following performance indicators are recommended to track progress:

Performance Indicators:

1) Number of Customer Sewer Complaints
2) Number of Stoppages by:
   a. Cause: roots, grease, debris, pipe failure, other

3) Number Dry Weather Overflows by:
   a. Volume: <100 gallons; 100 to 999 gallons; 1000 to 9999 gallons; >10,000 gallons

b. Cause: roots, grease, debris, pipe failure, pump station failure, capacity, other

4) Number Wet Weather Overflows by:
   a. Volume: <100 gallons; 100 to 999 gallons; 1000 to 9999 gallons; >10,000 gallons
   b. Cause: roots, grease, debris, pipe failure, pump station failure, capacity, other

5) Number of Cave-Ins

6) Number of Pump Station Failures by:
   a. Electrical supply failure
   b. Electrical component failure
   c. Pump failure
   d. Blockage

7) Average time to respond:
   a. to SSO
   b. to customer complaint

8) Number of Grease Trap:
   a. Inspections
   b. Violations

9) Lost-time injury rate (as a percentage of total hours worked)

IV. Engineering

Engineering provides support within the Public Works Department including streets, storm water, parks, etc. Support functions for the wastewater group include:

- Maintaining standard design criteria and construction details for public and private sewers, streets, drainage, water distribution, treatment plants, etc.
- New construction review process that includes input from wastewater utilities staff
- Construction inspection
- Update collection system maps
- Maintain inventory of system assets within GIS

a. As-Built Plans

As-built plans are maintained by engineering and are used to update the collection system maps within the GIS system. Finalized plans are updated "as time permits". Both electronic and hardcopy atlas maps are available from engineering. The Engineering Department uses AutoCAD and ArcInfo for in-house design.

b. Sewer System Maps

Approximately 65% of the collection system has been GPS surveyed and maps updated. The updated maps are then available for the Public Works department field staff to utilize; however, line maintenance staff still rely on "E" size (36" x 44") blue-line drawings as they are the most accurate and up to date maps of the collection system. Line maintenance personnel periodically update the "E" size drawings to show corrections and additions.

Since the process of gathering GPS coordinates for all manholes is a slow and "as time permits" process, it is recommended that a copy of the line maintenance maps be provided to the GIS technicians to update the GIS collection system maps. A separate layer can be maintained for lines shown as "visually correct, no coordinate data". This would allow line maintenance to have access to 11x17 grid maps with manhole numbers. Updating would then be by line maintenance providing marked up (red line) 11x17 maps back to the GIS technicians for corrections and updating. Advantages include:

1. Line maintenance could be dispatched to specific manholes. Currently they are dispatched to street intersections or addresses.
2. Use of 11x17 grid maps are much more manageable than the large blue-line drawings.
3. Maintenance records will track repairs by asset number rather than street or intersection

Figure 7 presents an example of the recently developed grid maps with asset numbers assigned. Since these maps are only 65%, the need to reconcile with the blue-line drawings is recommended so crews can communicate by manhole number or asset number and have maps that can easily be stored and utilized in the field.

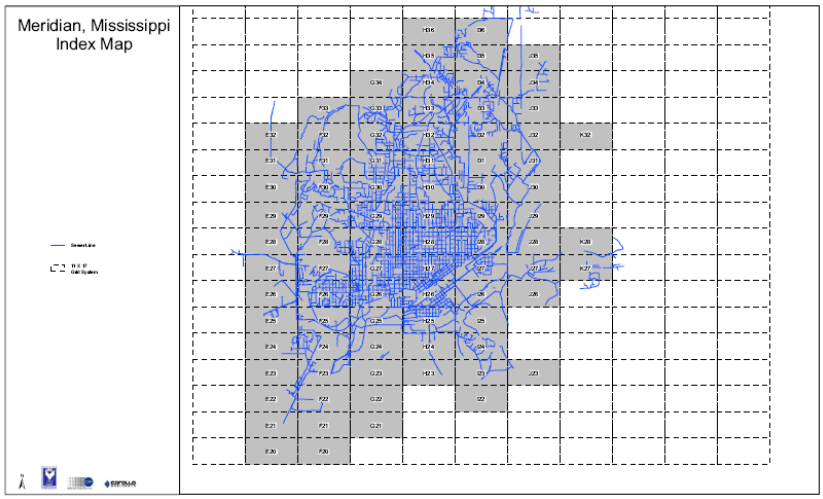
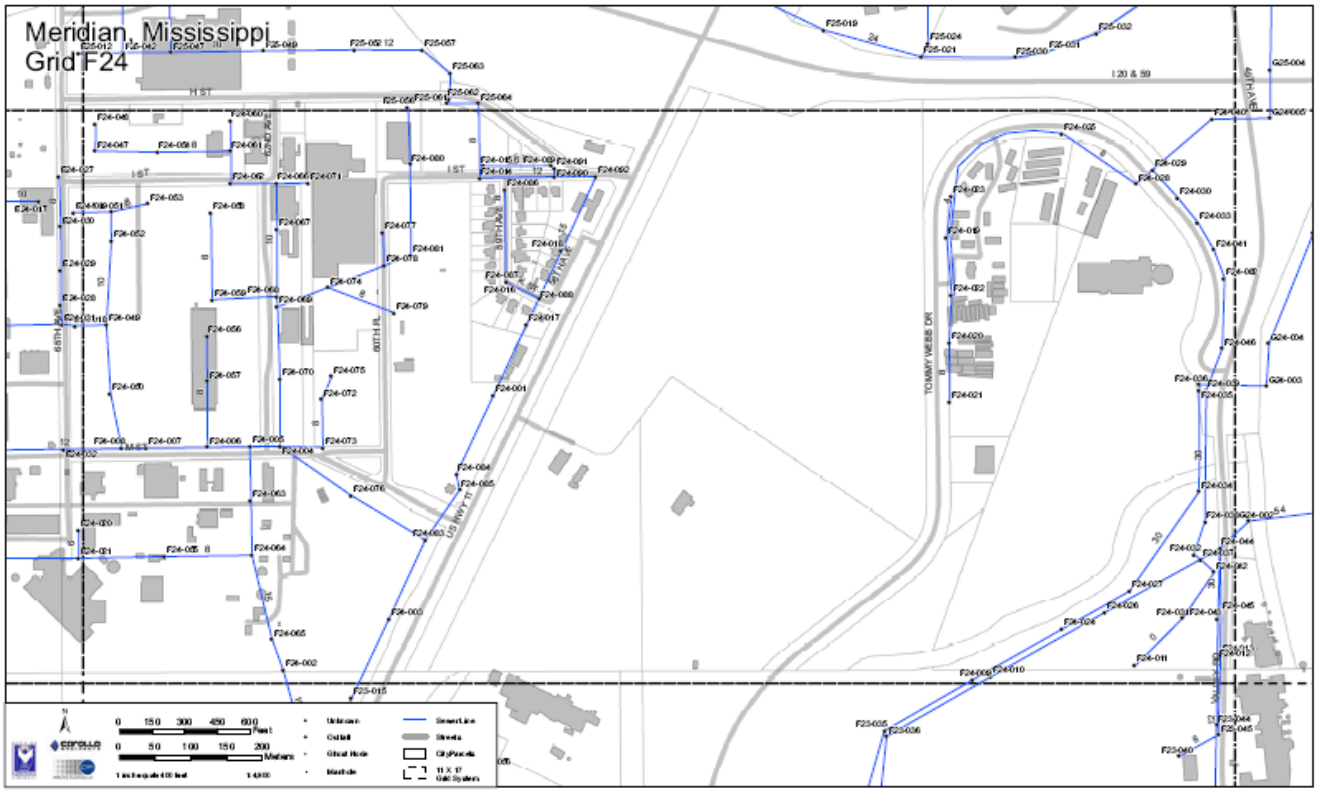


Figure 7
Example 11 x 17 GIS Grid Maps



Note: Grid maps identify each manhole by a unique number. The number consists of the Grid Page and number. In this example, manhole F24-083 is on grid map F24 and is identified as number 083.

Public Works relies heavily on mapping for dispatching crews, performing maintenance and tracking performance. With the current and future needs, GIS technicians that can provide coordination with engineering and line maintenance will prove beneficial. The GIS technician can minimize bottlenecks in data entry, mapping updates and provide special mapping needs such as displaying chronic SSO's, maintenance calls for blockages, lines with historical CCTV video, manhole inspection history and progress, smoke testing history, rehabilitation history, etc.

Engineering requires as-built drawings upon completion of a new development project. These as-built drawings are then used to update the GIS maps. Since moderate to large projects may take over a year to complete, the Public Works Department will not have maps showing these new assets. This may create a problem for line maintenance since they may receive service calls in areas that are not mapped. It is recommended that a policy be developed that will:

- Update GIS maps when "construction design plans" are approved. These design plans should be entered as a separate layer within GIS to distinguish them from as-built drawings.
- When a construction project is accepted, then the lines should be distinguished as being "under warrantee". Any service calls to lines under warrantee should be forwarded to the contractor.
- Prior to the warrantee period expiring, a scheduled final inspection should be undertaken by Public Works inspectors to ensure the project has met all warranties. A review of service calls during the warrantee period should identify problems and possible concerns while the project is still under warrantee.

c. Gravity Sewer Design

Most gravity sewer design projects are outsourced to local consulting engineers who use the City standards for design and materials. Depending on the project, consultants may perform some hydraulic evaluation for sizing of pipelines. A hydraulic model of the collection system is currently on-going that will provide recommendations and prioritization of needs. These prioritized needs can then be put into the CIP plan for implementation. The hydraulic modeling being undertaken is utilizing the InfoWorks dynamic model and can be used by current and future consultants working on the collection system.

New construction requires a minimum 8-inch SDR 26 (Appendix A, Section 25-19 Code of Ordinances) pipe and adherence to the subdivision ordinance. Line maintenance personnel are included in the design process and a 1-year warrantee period is required. There is no written policy on warrantee reviews or approvals.

d. Construction Inspection

Public Works provides construction inspection services depending on the type of project. For example, Public Works may provide their own inspector to test a new sewer line for acceptance. Construction warranties are normally required by contract. No written program has been developed to track warranty periods and perform warrantee inspections. Depending on the project type, inspection services may be outsourced or made part of the consulting engineers design contract. Appendix B presents "Construction Guidelines" developed by the City of Meridian. The International Building Code (2000 edition) is adopted by reference.

V. Technical Support Functions

a. Information Management

The City of Meridian has a computerized work management system that tracks complaints, budgets, etc. The system is not integrated with GIS mapping, wireless intranet or any automated vehicle location system that links to the work management system. Following is an example of how the system operates:

- A citizen telephones the Public Works office with a request for service
- The dispatch operator enters the information into the work management system
- A crew assignment is entered based on department procedures and location of nearest available crew vehicles
- Field crews receive the work order via radio
- Field crew enters the completed work order and provides the paper copy back for review and closing

This system is more labor intensive than many current work order systems and the City will need to consider upgrading in the future.

b. Contingency Planning

1. Public Notification

The City has several methods to inform the public including web site, newsletters, cable access, newspaper, door hangers and billing inserts. Since the City of Meridian provides water, sewer, storm sewer, streets, and solid waste services, the City Public Awareness coordinator in the Mayors Office can provide assistance in selecting the best method(s) for notification.

2. Regulatory Notification

Regulatory compliance and notification issues associated with the collection system is the responsibility of the line maintenance superintendent. During normal work times, the operations supervisors (collection system and lift station) will provide the required forms to the superintendent for notification where required. A draft Emergency Response Plan and Policy (See Appendix C) has been prepared on SSO response and reporting. The policy document is intended to be used to train staff in responsibilities and procedures and provides written documentation on procedures to be used by staff.

3. Pump Stations

Staff are trained and equipped for various emergencies. The transport of wastewater is dependent on 55 lift stations of various sizes and configurations. Sixteen (16) lift stations have telephone dial up telemetry. Except for the very

small lift stations, all have portable lift station hook-ups. A portable generator is available and sized to operate the largest pump. Pumping station key parts including motor controls and spare pumps are kept on-hand. Standardization of equipment has been undertaken and reliability of suppliers are reviewed by lift station staff. At a minimum, each pump station is inspected weekly while problematic stations every 2 to 3 days. There are no written preventive maintenance procedures. The lift station crew is composed of two which is not adequate to provide repairs and preventive maintenance for all the lift stations. Equipment is adequate for maintenance but at least two additional staff is recommended.

4. Collection System Parts Inventory

The City of Meridian purchasing department maintains an inventory of supplies including pipe, fittings, valves, etc. Emergency repairs may be required at any time of the day or night. This requires that key parts be on-hand and readily available. Purchasing maintains a minimum reorder quantity. When inventory reaches the minimum, then supplies are reordered. The minimum reorder quantity should consider the lag times in delivery of supplies and parts to ensure they are available when needed. In addition, plastic pipe and other supplies are degraded by sunlight and purchasing needs to be made aware of storage requirements to protect the supplies.

c. Ordinance Review

1. Sewer Use Ordinance (SUO)

The sewer use ordinance (Appendix A) has standard language with regards to prohibited discharges including storm water, grease, fats, etc. Following is the general sewer use requirements within the ordinance:

"Sec. 25-115. Prohibited discharges to public sewers.

No user shall contribute or cause to be contributed, directly or indirectly, any pollutant or wastewater which will interfere with the operation or performance of the sewage works. These general prohibitions apply to all such users of sewage works whether or not the user is subject to national categorical pretreatment standards or any other national, state, or local pretreatment standards or requirements. Users which are subject to the national categorical pretreatment standards shall contact the state department of natural resources, bureau of pollution control for further directions. A user may not contribute the following substances to the sewage works:

(1) Any liquid, solids or gases which, by reason of their nature or quantity, are, or may be, sufficient, either alone or by interaction with other substances, to cause fire or explosion or be injurious in any other way to the sewage works or to the operation of the sewage works. At no time shall two (2) successive readings on an explosion hazard meter, at the

point of discharge into the system (or at any point in the system) be more than five (5) percent nor any single reading over ten (10) percent of the lower explosive limit (LEL) of the meter. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, sulfides, and any other substances which the city, the state or the U.S. Environmental Protection Agency has notified the user is a fire hazard or a hazard to the system.

(2) Any waters or wastes containing toxic or poisonous solids, liquids, or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, create a public nuisance, or create any hazard in the receiving waters of the sewage treatment plant, including, but not limited to, cyanides in excess of 0.05 mg/l as CN in the wastes as discharged to the public sewer.

(3) Any waters or wastes having a pH lower than 6.0, or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sewage works.

(4) Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities such as, but not limited to: grease, garbage with particles greater than one-half inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas, tar, asphalt residues, residues from refining, or processing of fuel or lubricating oil, mud, or glass grinding or polishing wastes.

(Ord. No. 3691, Art. V, § 3, 5-1-84)"

The sewer use ordinance should be reviewed and updated by staff to include specific language dealing with extraneous infiltration/inflow and FOG (fats, oils and grease). A sample SUO is presented in Appendix D for consideration. Updating the SUO to specifically address infiltration/inflow on private service lines will be necessary to fully implement an infiltration/inflow reduction program.

2. Fat, Oil and Grease (FOG) Ordinance

The FOG ordinance is recommended for staff review and updating. Sewer blockages due to grease is the primary cause for sanitary sewer overflows. No current ordinance specifically address fats, oil and grease. Appendix E presents a Draft FOG ordinance for staff review and consideration. Many cities have developed comprehensive ordinances that can be compiled for

review. Appendix F presents an example FOG Policy for staff review. Since grease is the single largest source for preventable SSO's within the collection system, the need for updating the ordinance and policy is a high priority. The State Health Department has responsibility for inspecting restaurants for health violations. However, discussions with the State Health Department determined that they do not inspect grease traps or inquire on the frequency of cleaning. Unless a grease trap is visibly overflowing or causing backups, then no inspection is undertaken during routine inspections by the Health Department.

This is a loop-hole in the current system not only for Meridian, but all cities in Mississippi. It would be most efficient for existing state health inspectors to also inspect grease traps during regular inspections. As the Mississippi DEQ and EPA all agree that grease is a major cause for SSO's. By adding grease trap inspections, the number of blockages and resulting SSO's should be reduces. Currently, the City of Meridian would be required to duplicate the inspection process of the Health Department to ensure grease traps are being maintained. We recommend the City of Meridian work with the local Health Department to develop and implement a minor change in the State check list that could have major impact and prevent a duplication of efforts.

3. Summary

Items that need to be addressed in the SUO and FOG ordinance include:

Grease Traps – The current FOG ordinance does not have design criteria to ensure grease traps are of sufficient size to properly intercept grease. Newly constructed grease traps are inspected during construction. Existing grease traps are rarely inspected by code enforcement. Each grease trap within the City should be physically inspected to ensure it is functioning properly. Cleaning manifests should be checked for compliance and disposal at approved facilities. These inspections are best performed by the State Health Department since they can immediately write citations for non-compliance and routinely inspect major sources of grease discharge (schools, restaurants, etc).

In addition to restaurants, apartments are a major source for grease. The City should review the impact of apartments and consider requiring installation of grease trap(s) at apartment and other multifamily housing. All new apartment complexes would have to comply while existing apartments could be brought into compliance over 5 years for example.

VI. Administrative/Support

a. Human Resources

Position Descriptions – The City of Meridian maintains written descriptions for every position within the Public Works Department. The Civil Service system is used to fill field crew positions within the City. Under this system, long delays between posting an opening and filling the opening are common. Currently the Public Works Department has approximately 46 positions of which 32 are filled. Certification is not required by the State for (only voluntary) wastewater collection system operators.

b. Safety Program

Safety is of paramount importance to the City of Meridian because upon it hinges the well-being of the employees and residents. Employees are held responsible for both their personal actions and safe conditions in their work areas. Any unsafe condition or procedure is reported to their immediate supervisor for corrective action.

The primary purpose of the Safety Training Program is to keep employees aware of hazards associated with the nature their job. The utility does not have a written safety policy that details the responsibilities for safety and consequences for unsafe acts. A safety committee meets regularly to review accidents. Safety equipment includes:

- Gloves
- Ventilation equipment
- Hard hats, safety glasses, boots
- First Aid kits
- Tripods
- Fire extinguishers
- Gas detectors (oxygen, hydrogen sulfide, combustible)
- Body harness
- Protective clothing
- Traffic control equipment

Monthly safety meeting are conducted and documented with sign-up sheets. Performance indicators are used by the safety coordinator to monitor the safety program. Tracking the number of injuries and near miss injuries provides a measure on the effectiveness of the program and quickly identifies when additional training is needed or possible topics for upcoming safety meetings.

Material Safety Data Sheets (MSDS) are not currently maintained for chemicals commonly used by staff. No confined space permit program is currently in effect. Calibration documentation for gas detectors used in confined space is currently not maintained. A priority for the safety

committee is the review and updating of safety policies. Areas that need to be addressed in the safety program include:

- Authority
- Confined Space Entry Permits
- Written Safety Procedures
- Traffic Management
- Trenching
- Safety Equipment Storage and Maintenance
- Performance Measures

Based on a review of the Safety Program the following recommendations are presented for consideration:

1. Implement random safety inspections for adherence to safety procedures and document inspection and summarize findings, inspect to ensure fire extinguishers, first aid kits and emergency phone numbers are readily available and properly serviced
2. Annually perform safety drill to review response times and coordinate with the fire department on methods of confined space rescue
3. Randomly check operation and calibration of gas detectors and establish if employee training has been adequate
4. Prepare a written safety policy manual and distribute to new employees (Appendix G presents a Draft Safety Manual for use in preparing documentation)
5. Inventory all chemicals used by the Department and prepare a file of material safety data sheets (MSDS). Provide training in the proper handling and storage of the various chemicals in use and update MSDS annually. Provide training in spills and health impact associated with exposure to the various chemicals.

c. Financial

Detailed budgets are prepared and tracked by staff. Current user rates are presented in Appendix A and are sufficient to fund wastewater needs as budgeted; however, budgets currently do not allocate sufficient funds for:

1. collection system rehabilitation to reduce infiltration/inflow
2. fully fund CIP projects for future growth
3. no provision or surplus in the budget to accommodate emergency repairs

Consistent funding on an annual basis for collection system renewal is a high priority in order to utilize least cost repair methods. Once the pipeline collapses the only repair method is emergency replacement which is at the highest cost. Systematic system rehabilitation will minimize emergency repairs and allow the use of lower cost internal repair strategies.

Pipelines that are at over capacity will need to be paralleled or replaced. These projects should be included on a prioritized Capitol Improvement Plan that looks out 5, 10 and 20 years to anticipate future needs and costs. Such a program will also include pump station upgrades or replacement. The current hydraulic modeling effort will be instrumental in evaluating capacity needs within the collection system.

Due to the age of the collection system, unexpected failures of pipelines and aging pump stations will require emergency repairs. Emergency funds should be budgeted to provide for such contingencies.

Rates are reviewed and adjustments presented to the City council for approval. Since water and wastewater revenues are used for non-water/wastewater expenses, the Public Works Department must work closely with the City council and administrators to ensure adequate funding is allocated for the aging collection system. The financial needs of the water and sewer system will continue to increase and the governing body must provide the resources for Public Works to maintain and expand the underground infrastructure.